ASSESSMENT OF THE FISHERY IMPROVEMENT OPPORTUNITIES ON THE PEND OREILLE RIVER

1989 ANNUAL REPORT

By:

Michael R. Barber
Becky L. Renberg
John J. Vella
Allan T. Scholz
Kelly L. Woodward
and
Suzy Graves

Upper Columbia United Tribes Fisheries Center
Department of Biology
Eastern Washington University

Prepared for:

Fred Holm
Project Manager
U.S. Department of Energy
Bonneville Power Adimistration
Division of Fish and Wildlife
Project Number 88-66
Agreement DE-I 79-88BP39339

September, 1990

EXECUTIVE SUMMARY

The purpose of this study was to assess the fishery improvement opportunities on the Box Canyon portion of the Pend Oreille River. This three year study was initiated as part of the Northwest Power Planning Council's 1987 Columbia River Basin Fish and Wildlife Program. This report contains the findings of the second year of the study.

Chinook salmon (*Oncorhynchus* tshawytscha [Walbaum]) and steelhead trout (*Oncorhynchus* mykiss [Richardson]) were present in the Pend Oreille River prior to construction of Grand Coulee Dam. The river also contained native cutthroat trout (*Oncorhynchus clarki* [Richardson]), bull trout (*Salvelinus confluentus* [Suckley]) and mountain whitefish (*Prosopium williamsoni* [Girard]). After construction of Grand Coulee Dam, rainbow trout were planted in the river and some grew to lengths in excess of 30 inches (760 mm). With the construction of Box Canyon Dam, in 1955, the most procuctive section of the river was inundated. Following the construction of the dam the trout fishery declined and the populations of spiny ray fish and rough fish increased. Currently, yellow perch (*Perca flavescens* [Mitchill]) are the predominant fish species in the river and largemouth bass (*Micropterus salmoides* [Lacepede]) are the predominant sport fish.

The objectives of the second year of the study were to determine:

1. the relative abundance of each species in the river and sloughs;
2. the population levels in five selected tributaries and, if possible, for fish in the river and sloughs;
3. fish growth rates;
4. the feeding habits and abundance of preferred prey;
5. migration patterns;
6. the total fishing pressure, catch-per-unit-effort, and total harvest by conducting a year-round creel survey.

Electrofishing surveys resulted in the capture of 17,554 fish from November 1988 through December 1989. The catch was composed of 45.1 percent yellow perch, 16.5 percent pumpkinseed (*Lepomis gibbosus* [Linnaeus]), 9.1 percent largemouth bass, 8.3 percent tench (*Tinca tinca* [Linnaeus]), 6.0 percent mountain whitefish (*Prosopium williamsoni* [Girard]), 4.5 percent largescale

sucker (*Catostomus macrocheilus* [Girard]), 3.5 percent northern squawfish (*Ptychocheilus oregonensis* [Richardson]). Trout were rare with brown trout being the most abundant at 0.7 percent of the total catch.

Population estimates in the 90 km long Box Canyon Reservoir were made using the Schnabel multiple mark and recapture technique. The yellow perch population was estimated at 6,010,448 with 95 percent confidence limits ranging from 4,139,850 to an upper limit of 9,116,972. The pumpkinseed population was estimated at 3,889,758 with a range of 1,969,498 to 9,152,371. The population estimate for tench was 1,085,921 with a range of 497,368 to 2,961,603. The estimated population for largemouth bass was 590,906 with the 95 percent confidence limits at 399,193 to 1,390,366. The northern squawfish population was estimated at 248,988 with a range of 97,642 to 995,950. The estimated population for largescale suckers was 186,693 with the 95 percent confidence limits at 79,782 to 583,416. The longnose sucker estimate was 183,457 with a range of 62,542 to 917,286. The population estimate for mountain whitefish was 163,890 with a range of 70,038 to 512,156. Brown bullhead populations were estimated at 36,200 with a lower limit of 6,464 and an upper limit of 362,001. The brown trout population was estimated at 7,264 with a range of 3,104 to 22,701.

Population estimates were made using the removal depletion method at four sites on each of the five tributaries. The highest densities of brown trout, brook trout and cutthroat trout from the four sites on Skookum Creek (±95% C.I.) were 80.9 ± 6.5, 50.7 ± 4.7, and 2.1 ± 1.5 fish/100 m^2, respectively. The highest densities from Cee Cee Ah Creek (± 95% C.I.) were 35.6 ± 7.1 fish/100 m^2, for brown trout, 34.0 ± 5.7 fish/1 00 m^2 for brook trout and 13.2 ± 8.2 fish/l 00 m^2 for cutthroat trout. The highest densities of brook trout and cutthroat trout from Tacoma Creek (± 95% C.I.) were 26.3 ± 1.1 and 4.5 ± 2.6 fish/100 m^2, respectively. The highest densities from sites on LeClerc Creek (± 95% C.I.) were 6.0 ± 0.6 fish/100 m^2 for brown trout, 10.2 ±10.0 fish/100 m^2 for brook trout and 1 .1 ± 0.0 fish/100 m^2 for cutthroat trout. Ruby Creek brook trout densities were 34.0 ± 5.7 fish/100 m^2 and cutthroat trout densities were ≥0.5 fish/l 00 m^2.

Growth rates for largemouth bass in the Box Canyon Reservoir were lower than bass from other locations in the northern and northwestern United States during the first four years. However, growth rates after the fourth year were comparable to other locations, and in some cases higher. This may indicate that food is limiting bass growth until they reach a size that enables them to eat fish. Although their growth rates are lower than normal, a substantial number of largemouth bass in excess of 500 mm were captured in electrofishing surveys during the spring when they are concentrated in the sloughs for spawning.

Growth rates and condition factors for yellow perch, black crappie, brown trout, cutthroat trout, and rainbow trout in the reservoir tended to be low in comparison to other locations. Growth rates for mountain whitefish were good compared to those from other locations. Growth rates of brown trout in Pend Oreille River tributaries were lower than other locations in the Pacific Northwest. Cutthroat and brook trout growth was good in relation to other streams in the region.

Mean annual invertebrate densities in the river ranged from 5,715 to 24,004 organisms/m^2 at reservoir sites and ranged from 8,387 to 38,629 organisms/m* in slough sites. Densities of macroinvertebrates in the river and sloughs were low in comparison to other systems in the Pacific Northwest. Mean annual invertebrate densities in Pend Oreille River tributaries ranged from 1,738 organisms/m* in Ruby Creek to 4,658 organisms/m* in Skookum Creek. Mean annual densities in the drift ranged from 97 organisms/l 00 m^3 in Skookum Creek to 420 organisms/100 m^3 in Ruby Creek. Invertebrate densities were also lower in the tributaries than in other streams of comparable size in the region.

Mean zooplankton densities ranged from 10.5 organisms/l, in March, to 385.6 organisms/l, in June, in mid-channel samples. Samples taken from littoral areas had mean densities that ranged from 25.9 organisms/l, in March, to 302.3 organisms/l, in June. Seventy-nine percent of the zooplankton collected from the mid-channel were rotifers, 16 percent were copepods, and 5 percent were cladocerans. Zooplankton littoral samples was 60 percent rotifers, 23 percent copepods, and 17 percent cladocerans. Cladoceran biomass ranged from 0.82 μg/l, in March, to 22.65 μg/l, in July, in mid-channel samples, and from 1.20 μg/l, in March, to 110.23 μg/l, in July in littoral samples. Cladoceran and copepod densities from the mid-channel of the reservoir were about average in comparison to other lakes and reservoirs in the region.

Diet analysis of river and slough fish revealed that black crappie, tench, and 0+ through 3+ largemouth bass were primarily planktivorous and yellow perch, whitefish, and brown trout fed most frequently on benthic macroinvertebrates. Older largemouth bass and northern squawfish fed upon fish. All species of fish were opportunistic in their feeding upon benthic macroinvertebrates with most electivities near zero. The planktivorous fish had high electivities for Daphnidae and Chydoridae. Diet overlaps were high between yellow perch and young bass due to their common reliance upon zooplankton as a food item. High overlaps were common between other fish species in the reservoir, in general, as a result of many species of fish utilizing Chironomidae larvae, Daphnidae and Chydoridae.

The recapture of tagged fish showed that most remain in the same area as where they were tagged. Fish that did move tended to move only short distances. Many of the largemouth bass that moved had been caught and displaced by bass tournament anglers.

Angler effort from January to December, 1989, was estimated at 3,029 ± 374 hours for the Box Canyon Reservoir. The catch-per-unit-effort (CPUE) for total catch was estimated to be 5.49 fish/hour for boat anglers and 6.84 fish/hour for shore anglers. The CPUE for total catch in 1989 was more than twice the CPUE for total catch in 1988. Largemouth bass made up 89 percent of the catch by boat anglers followed by black crappie at 5 percent. Yellow perch made up 77 percent of the catch by shore anglers followed pumpkinseed at 9 percent. The CPUE for harvested fish was 0.16 fish/hour by boat anglers and 0.94 fish/hour for shore anglers. The total harvest was estimated at 1,331 ± 164 fish including 684 ± 84 yellow perch, 182 ± 22 pumpkinseed, 181 ± 23 bulltrout, 103 ± 12 largemouth bass, and 102 ± 12 squawfish.

ACKNOWLEDGEMENTS

The authors gratefully acknowledge the following individuals for their assistance in field data collection and laboratory analysis: Roger Willms, Dale Chess, Lloyd Finley, George Campbell, Glen Nenema Jr., David Nenema, Loreley Clark, Suzie Lam, Diana Richards, Kiki Lam, Tammy Skillingstaad, Richard LeCaire, Rich Williams, Kathleen O'Shields, Laura Dunton, Steve Martin, Dave Cunnington, Dave Renberg, Nate Renberg, George Gerainos, Zorre Dearborn, Cindy Abrahamson, Lori Hill, and Curt Holmes. Funding was provided by the U.S. Department of Energy, Bonneville Power Administration, Contract number DE-AI 79-88BP39339. Additional financial support for this project was provided by a grant from the U.S. Department of Interior, Bureau of Indian Affairs to the Upper Columbia United Tribes (UCUT) to fund the operation of the UCUT Fisheries Center at Eastern Washington University (Grant No. P12614208001). All capitol equipment for this project was supplied by the UCUT Fisheries Center. Special thanks go to Fred Holm (BPA Project Manager), Glen Nenema (Chairman, Kalispel Tribal Council), and Dave Bonga (Kalispel Tribal Planner) for their assistance.

TABLE OF CONTENTS

1 .0 INTRODUCTION

In 1987, the Northwest Power Planning Council amended its Columbia River Basin Fish and Wildlife Program to include: *"An assessment of fishery improvement opportunities in the Pend Oreille River* within *the* boundaries *of the Kalispel Indian* Reservation. *This survey will provide: i) Baseline information about existing fish populations and habitat and ii) information on possible means of improving fisheries. When the assessments are completed, recommendations for projects will be submitted to the Council"* [Section 903(g)(l)(G)]. The Council's Five Year Action Plan stated that the Bonneville Power Administration (BPA) should commence funding of a three year assessment of the fishery improvement opportunities on the Pend Oreille River adjacent to the Kalispel Reservation starting in Fiscal Year 1988 [Section 1400(7.7)]. In 1988, BPA contracted the Kalispel Tribe to conduct this assessment. This report, contains the results of the second year of the survey.

1.1 FISHERIES MANAGEMENT HISTORY OF THE PEND OREILLE RIVER

See Barber *et al.* (1989) for a discussion of the past fisheries management history of the study area, encompassing the Box Canyon Reservoir between Box Canyon Dam and Albeni Falls Dam.

1.2 SUMMARY OF 1988 FINDINGS

Electrofishing surveys resulted in the capture of 19,931 fish from March through October, 1988. Fish species captured include:

Brown trout	*Salmo trutta* [Linnaeus]
Cutthroat trout	*Oncorhynchus clarki* [Richardson]
Rainbow trout	*Oncorhynchus mykiss* [Richardson]
Brook trout	*Salvelinus fontinalis* [Mitchill]
Bull trout	*Salvelinus confluentus* [Suckley]
Kokanee	*Oncorhynchus nerka* [Wal baum]
Mountain whitefish	*Prosopium williamsoni* [G i rard]
Largemouth bass	*Microp terus salmoides* [Lacepede]
Black crappie	*Pomoxis nigromaculatus* [Lesueur]
Pumpkinseed	*Lepomis gibbosus* [Linnaeus]
Yellow perch	*Perca flavescens* [Mitchill]
Tench	*Tinca tinca* [Linnaeus]
Redside shiner	*Richardsonius balteatus* [Richardson]

Northern squawfish	*Ptychocheilus oregonensis* [Richardson]
Peamouth	*Mylocheilus caurinus* [Richardson]
Lake chub	*Couesius plumbeus* [Agassiz]
Longnose sucker	*Catostomus catostomus* [Forster]
Largescale sucker	*Catostomus macrocheilus* [Girard]
Brown bullhead	*Ictalurus nebulosus* [Lesueur]
Sculpin	*Cottus* spp.

The catch was composed of 42.1 percent yellow perch, 19.0 percent pumpkinseed, 9.6 percent tench, 7.2 percent largemouth bass, 5.3 percent northern squawfish, 4.8 percent largescale sucker, and 4.3 percent mountain whitefish. Trout were rare with brown trout being the most abundant at 0.6 percent of the total catch.

Population estimates in the 90 km long Box Canyon Reservoir were made using the Schnabel multiple mark and recapture technique. The yellow perch population was estimated at 41,777,446 with 95 percent confidence limits ranging from 23,872,826 and an upper limit of 80,859,573. The pumpkinseed population was estimated at 16,822,372 with a range of 7,704,903 to 45,879,1 96. The population estimate for tench was 4,282,807 with a range of 2,081,920 to 10,707,019. The estimated population for largescale suckers was 821,863 with the 95 percent confidence limits at 432,560 to 1,849,192. The longnose sucker estimate was 781 ,1 66 with a range of 357,786 to 2,130,452. The population estimate for largemouth bass was 657,549 with a range of 455,727 to 989,859. The squawfish population estimate was 580,565 with the 95 percent confidence limits at 357,271 and 1,009,679. The black crappie population estimate was 579,588 with a range of 1 03,498 to 5,795,881. The population estimate for mountain whitefish was 164,252 with a range of 120,185 to 231,258. Trout populations could not be estimated due to their low rate of capture.

Population estimates were made for five tributaries using either the Petersen or removal depletion method. Skookum Creek populations (±95% C.I.) were estimated to be 10,543 ± 4,551 brown trout, 13,625 ± 5,369 brook trout, and 47 ± 23 cutthroat trout for the entire 17.1 km length of stream. Population estimates for Cee Cee Ah Creek were 11,357 ± 3,411 brown trout, 9,111 ± 2,564 brook trout, and 42 ± 28 cutthroat trout in 15.5 km. Populations estimates for Tacoma Creek were 90,903 ± 75,655 brook trout and 4,072 ± 7,059 cutthroat trout in 33.1 km. Population estimates for the West Branch of LeClerc Creek were 1,222 ± 216 brown trout, 1,043 ± 72 brook trout, and 72 cutthroat trout in 26.3 km. The population estimates for Ruby Creek were 25,568 ± 6,486 brook trout and 1,598 cutthroat trout in 18.8 km.

Growth rates for largemouth bass, yellow perch, brown trout, brook trout, and rainbow trout in the reservoir were low in comparison to other locations in the Pacific Northwest. Growth rates for mountain whitefish, black crappie, and cutthroat trout were as good or better than those from other locations. Growth rates of trout in Pend Oreille River tributaries tended to be lower than other locations in the Pacific Northwest for brown trout but higher for brook trout and cutthroat trout.

Even though their growth rates were lower than normal, a substantial number of largemouth bass in excess of 500 mm and some brown trout over 600 mm were captured. One rainbow trout was captured that was 720 mm long. Largemouth bass concentrate in the sloughs in the late spring to spawn and during this time bass over 500 mm were common in electrofishing surveys. In the late summer and fall a fair number of brown trout greater than 600 mm and mountain whitefish over 400 mm were captured in Cee Cee Ah Slough and at the mouth of Cee Cee Ah Creek. Therefor, some species do attain large sizes in the reservoir, however they are typically only captured during times when they are concentrated.

Mean annual invertebrate densities in the river ranged from 4,508 to 17,234 organisms/m2 at reservoir sites. Mean annual densities in the sloughs ranged from 6,415 to 13,354 organisms/m^2. Densities in the river and sloughs were also lower than other locations in the Pacific Northwest but diversities were higher. Mean annual invertebrate densities in Pend Oreille River tributaries ranged from 4,823 organisms/m^2 in LeClerc Creek to 5,921 organisms/m2 in Cee Cee Ah Creek. Mean annual densities in the drift ranged from 68 organisms/100 m^3 in Cee Cee Ah Creek to 282 organisms/100 m^3 in Skookum Creek. Invertebrate densities in the tributaries to the Pend Oreille River were lower than in other streams of comparable size in the region but the diversities were higher.

Mean zooplankton densities ranged from 45 organisms/l in October to 326 organisms/l in June. For the year, 58 percent of the zooplankton were rotifers, 32 percent were copepods, and 10 percent were cladocerans. Cladoceran biomass ranged from 5.8 micrograms/l in April to 20.7 micrograms/l in June. Cladoceran and copepod densities were higher in the Pend Oreille River than most other lakes and reservoirs in the region.

Diet analysis of fish collected in the river and sloughs revealed that yellow perch, black crappie, tench, and 0+ through 3+ largemouth bass were primarily planktivorous. All other species fed mainly on benthic macroinvertebrates. Exceptions were cutthroat trout and redside shiners, which fed upon terrestrial organisms, and older largemouth bass and northern squawfish, which fed upon fish. All species of fish were opportunistic in their feeding with most electivities near zero. Diet overlaps were high between yellow perch and young bass due to their common reliance upon zooplankton as a food item. Overlaps were also high between young bass and black crappie, black crappie and yellow perch, pumpkinseed and mountain whitefish, pumpkinseed and brown bullhead, and mountain whitefish and brown bullhead.

The feeding analysis of trout collected from the tributaries revealed that, based on the Index of Relative Importance (IRI), Baetidae and Limnephilidae were important brown trout food organisms. Trichoptera pupae, Limnephilidae, Oligochaeta, and Chironomidae pupae were important food items for brook trout and Diptera adults, Elmidae, and Hymenoptera were important to cutthroat trout. Electivities indicated that all trout in the tributaries were relatively opportunistic with most values around zero.

From March through December angler effort was estimated at 4,139 ± 467 hours. The catch per unit effort (CPUE) was estimated to be 2.06 fish/hour for boat anglers and 2.90 fish/hour for shore anglers. Largemouth bass made up 68 percent of the catch by boat anglers followed by yellow perch at 21 percent. Yellow perch made up 66 percent of the catch by shore anglers followed by brown bullhead and pumpkinseed at 10 and 9 percent, respectively. The CPUE for harvested fish was 0.34 fish/hour by boat anglers and 0.93 fish/hour for shore anglers. The total harvest was estimated at 2505 ± 312 fish including 1,268 ± 157 yellow perch, 389 ± 40 largemouth bass, 312 ± 44 brown bullhead, and 278 ± 39 pumpkinseed. The differences in the CPUE's can be largely attributed to the catch and release fishing of bass anglers and the small size of most of the yellow perch in the river. The success of bass anglers during catch and release bass tournaments was not included in the CPUE calculation.

1.3 STUDY OBJECTIVES

The purpose of this three year study is to identify fishery improvement opportunities for the Box Canyon Reservoir of the Pend Oreille River. Species targeted in this study included all trout, mountain whitefish, largemouth bass, black crappie, and yellow perch. The objectives of the study were to collect information on:

1. population dynamics (including relative abundance, population levels, natural and fishing mortality, and recruitment);
2. growth rates;
3. feeding habits;
4. behavior patterns; and
5. factors limiting fish production (e.g., food availability, competition, habitat availability, environmental fluctuations).

At the end of the study, the information will be combined to develop recommendations for fisheries projects, cost estimates for each alternative, and estimates for success (in terms of increasing fish production) of each alternative. The three year time period should provide enough time so that any changes in fish populations, fish growth, and fish diets due to environmental fluctuations could be observed and analyzed. Upon completion of these assessments, recommendations for fisheries enhancement projects will be submitted to the Northwest Power Planning Council.

The second year study objectives were to determine:

1. the relative abundance of each species in the river and sloughs;
2. the population levels in five selected tributaries and, if possible, for fish in the river and sloughs;
3. fish growth rates;
4. the feeding habits and abundance of preferred prey;
5. the migration patterns; and
6. the total fishing pressure, catch per unit effort, and total harvest by conducting a year-round creel survey.

2.0 METHODS AND MATERIALS ·

The methodology used for sample collection was the same as Barber *et al.* (1989) unless otherwise noted.

2.1 DESCRIPTION OF THE STUDY AREA

The Pend Oreille River begins at the outlet from Pend Oreille Lake, ID, and flows in a westerly direction. The river turns north near Dalkena, WA, and flows into British Columbia, Canada where it enters the Columbia River. The approximate drainage area of the river at the international border in 65,300 km? Fig. 2.1 shows the 36-year mean monthly flows and the mean flows that occurred during the sampling months at the Newport, WA gage. The normal high flow month is June with a mean discharge of 61,858 CFS. In 1989, the mean flow in June was 41,190 CFS and the high flow was in May at 46,020 CFS. The normal low flow month is August with a mean discharge 11,897 CFS. In 1989, the lowest mean monthly flow was in January with a mean discharge of 10,770 CFS. Flows were below average from November, 1988 through July, 1989 and above average from August through December, 1989.

The study area covers the 90 kilometer section of the river from Box Canyon Dam at river kilometer (RK) 55.5 to Albeni Falls Dam at RK 145 (Fig. 2.2). Within this reach, eleven river, four slough, and four tributary study sites were established (Table 2.1). The tributaries studied were Skookum Creek, Cee Cee Ah Creek, Tacoma Creek, and LeClerc Creek. Ruby Creek was added in 1989 as a tributary study site.

The only addition to the fish species list reported by Barber *et al.* (1989) was lake trout (*Salvelinus namaycush* [Walbaum]. Three were captured during 1989.

2.2 SAMPLING REGIME

All the information contained in this report was collected from November 1988 through December 1989, with the exception of the creel which includes data collected from January through December, 1989.

Between 3 to 10 days were spent in the field each month. Fish in the river and sloughs were marked for estimating population size

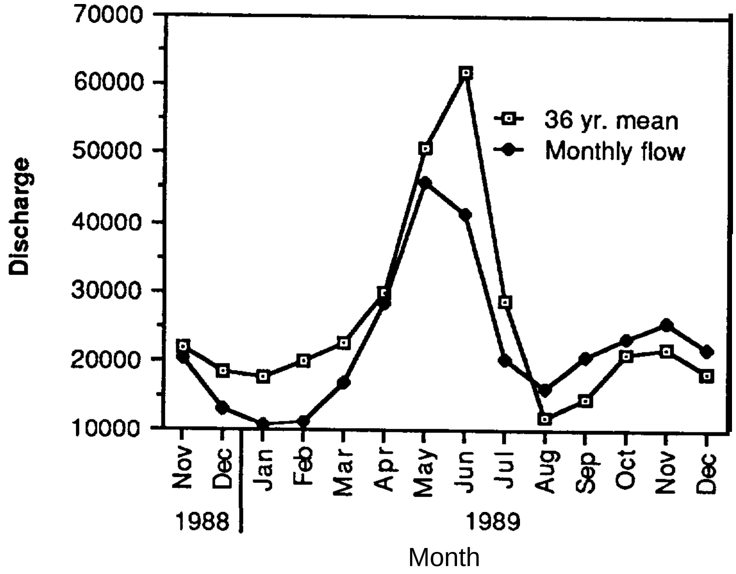

Figure **2.1.** Comparison of **36-year (1953-1988)** mean monthly flows with the mean monthly flow during November, **1988** through December, **1989** at Newport, WA (USGS gage **12395500).** The **1953-1987** data was compiled by **Soltero *et al.* (1988)** and the **1988** and **1989** provisional data was obtained from the USGS, Sandpoint, ID.

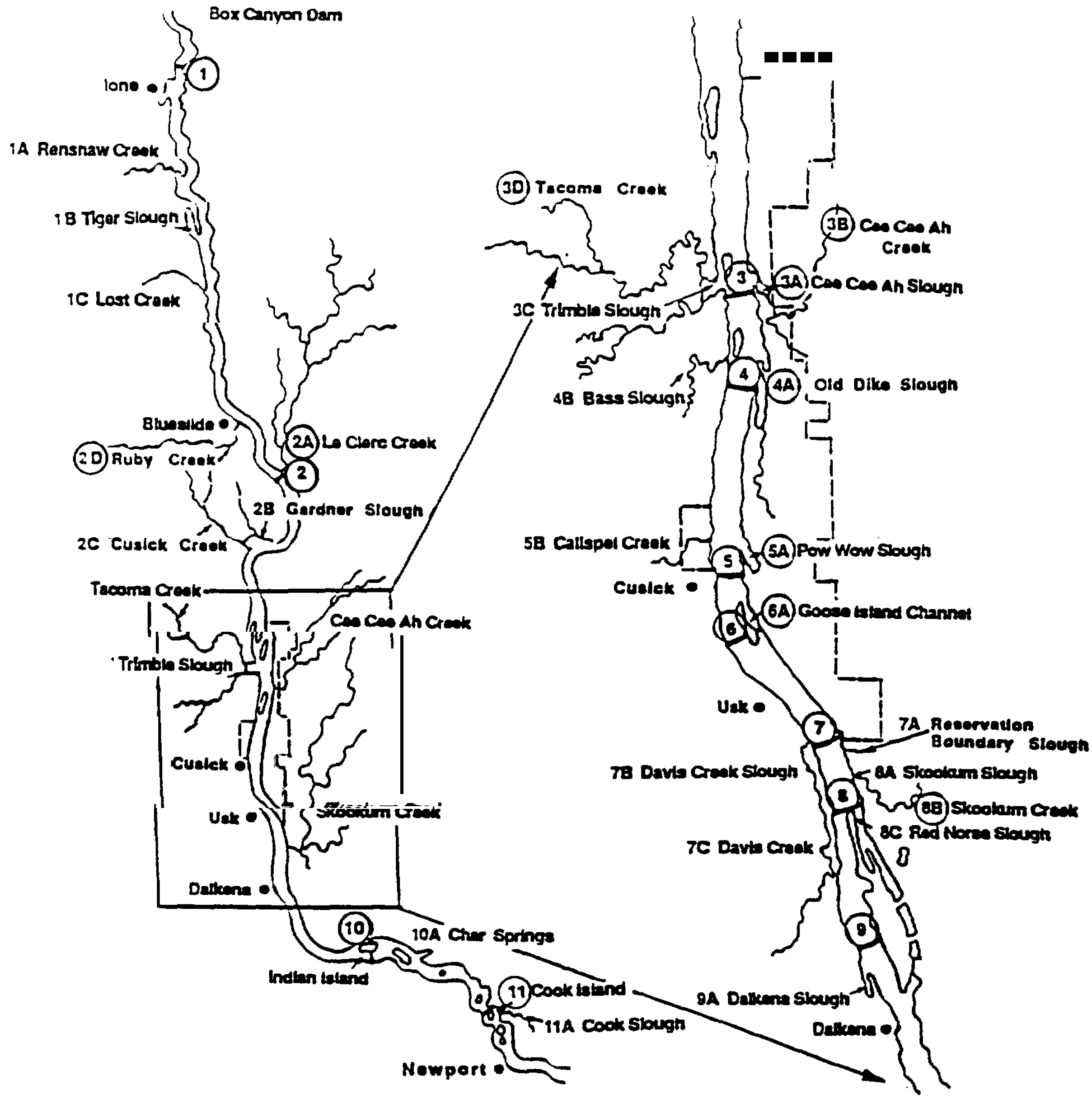

Figure **2.2.** Map of the **Pend Oreille** River showing the location of study sites.

Table **2.1.** Locations of study sites. Sites shown on Fig. **2.1** but not described here are not normal study sites but will be sampled when time and budget allows.

STUDY SITE	LOCATION
1	At RK 59.5, just north of Ione, WA
2	At RK 90.4, near the confluence with LeClerc Creek
2A	LeClerc Creek; confluence with the Pend Oreille River at RK 90.4
2D	Ruby Creek; confluence with the Pend Oreille River at RK 83.7
3	At about RK 107, near the mouth of Cee Cee Ah Slough
3A	Cee Cee Ah Slough; located at RK 107 on east bank
3B	Cee Cee Ah Creek; enters Cee Cee Ah Slough
3D	Tacoma Creek; enters Trimble Slough located on west bank at RK 107
4	At RK 108.6
4A	Dike Slough; east bank at RK 108.6
5	At RK 113, adjacent to Cusick, WA
5A	Pow Wow Slough; east bank at RK 112
6	At RK 114, adjacent to Goose Island
6A	Goose Island Slough, at RK 114
7	At RK 116.5
8	At RK 119, near mouth of Skookum Creek
8B	Skookum Creek; enters river on east bank at RK 118
9	At RK 121.5
10	At RK 130, adjacent to Indian Island
11	At RK 139.2, adjacent to Cook Island

monthly while collecting relative abundance, age, growth, and condition information. Tributary populations were measured during September. Information on fish feeding habits and food availability in the river, sloughs, and tributaries was collected in March, April, June, July, September, and October. Creel data was collected on 18 days (12 weekday and 6 weekend days) each month.

2.3 RELATIVE ABUNDANCE

No data were collected in February, 1989 due to the river freezing.

Since gill nets proved to be ineffective at catching fish in the mid-channel of the river in 1988, less effort was expended setting nets in 1989.

Due to dense macrophyte growths, beach seining was not conducted at sites 8C and 9A in August and September and not at all in October.

Beginning in June, smaller fish and non-target species were given a right pectoral fin clip instead of a Floy FD-67F anchor tag. This was necessary to distinguish fish tagged in 1989 from those tagged in 1988 for population estimation.

2.4 POPULATION ESTIMATES

2.4.1 RIVER

River population estimates were made using the Schnabel methods, as described in Barber et *al.* (1989). The tagging period for the estimate ran from June through December, in 1989, instead of March through October, in 1988.

2.4.2 TRIBUTARIES

Trout populations were estimated in Skookum, Cee Cee Ah, LeClerc, Tacoma, and Ruby Creeks in September, 1989. Four reaches (Figs. 2.3 through 2.7) ranging in size from 200 to 360 feet in length were blocked off with nets to prevent immigration and emigration during the estimate. From two to four electrofishing passes were then made depending upon the proportion of fish caught in a pass relative to the previous pass and time constraints. The goal was to catch less than 50 percent of the number of fish caught in the

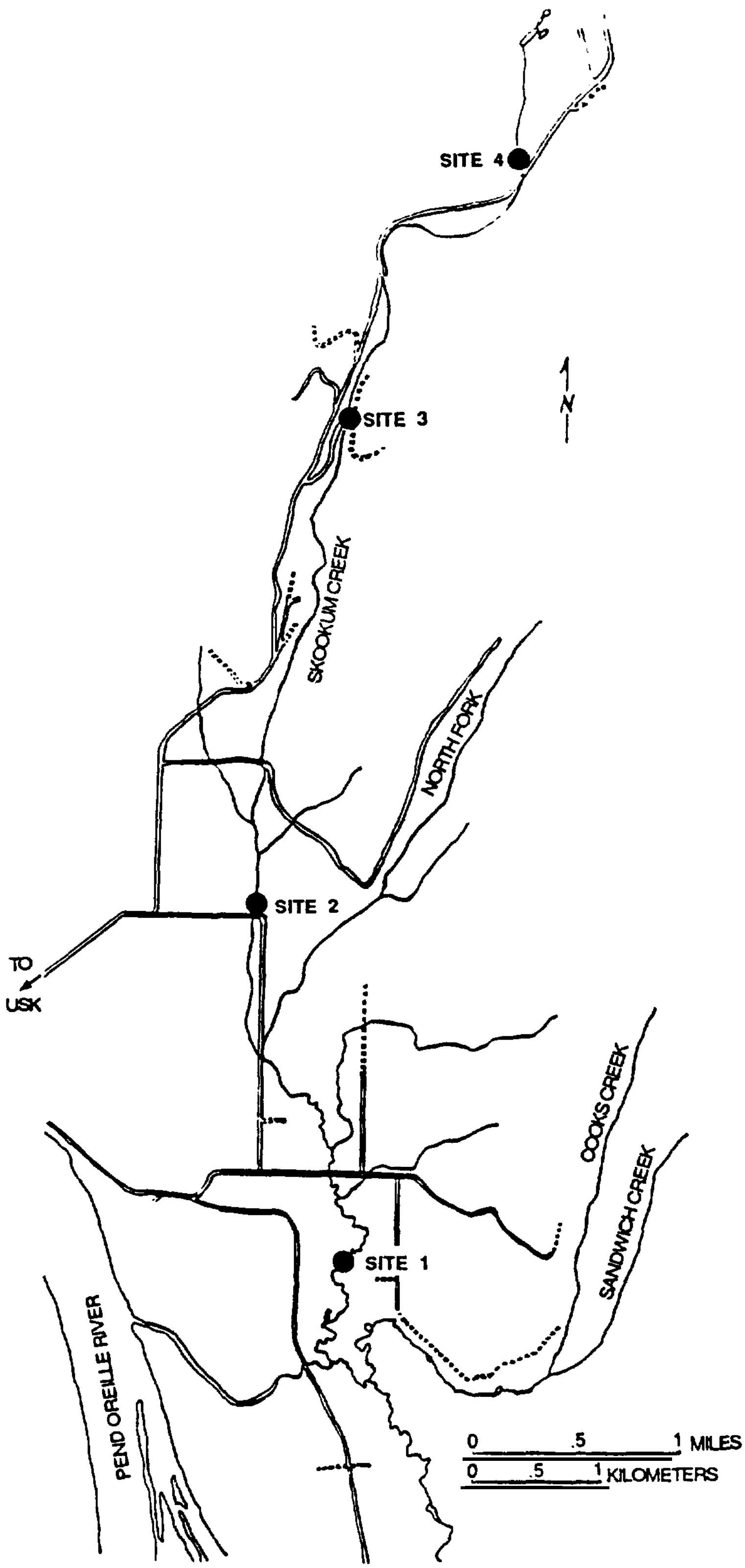

Figure 2.3 Map of Skookum Creek showing the locations of the population study sites.

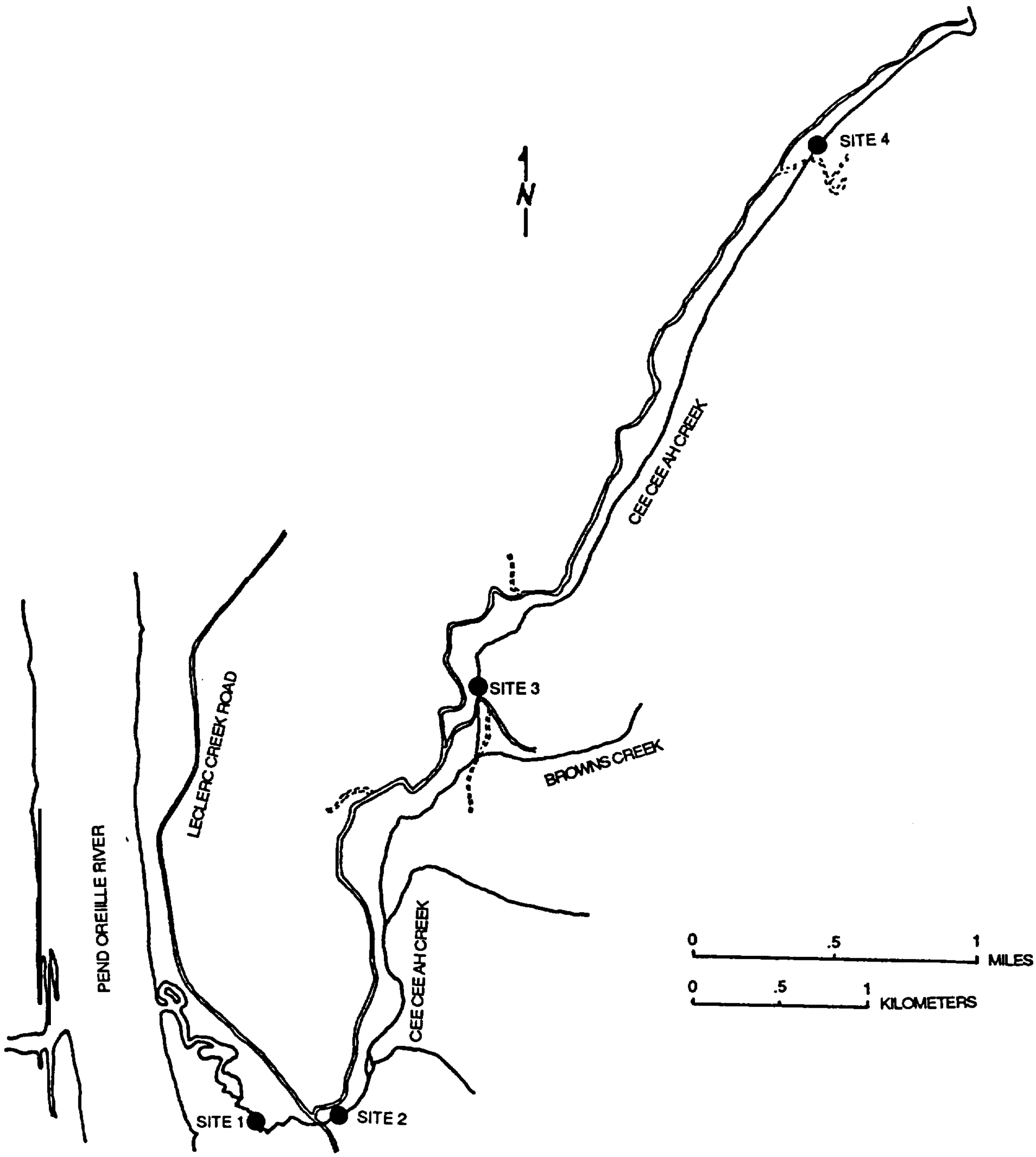

Figure **2.4** Map of **Cee Cee** Ah Creek showing the locations of population study sites.

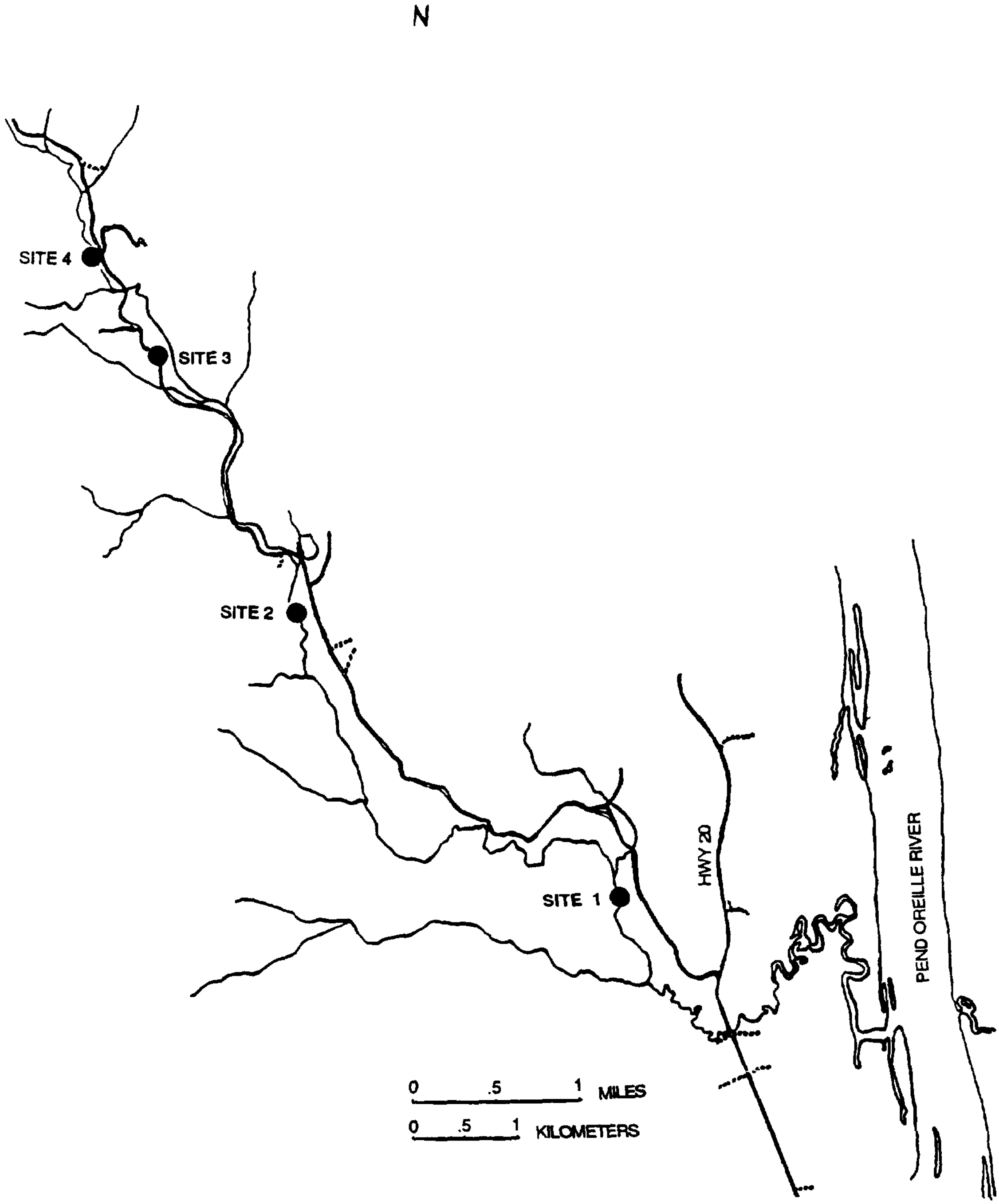

Figure **2.5** Map of Tacoma Creek showing the locations of population study sites.

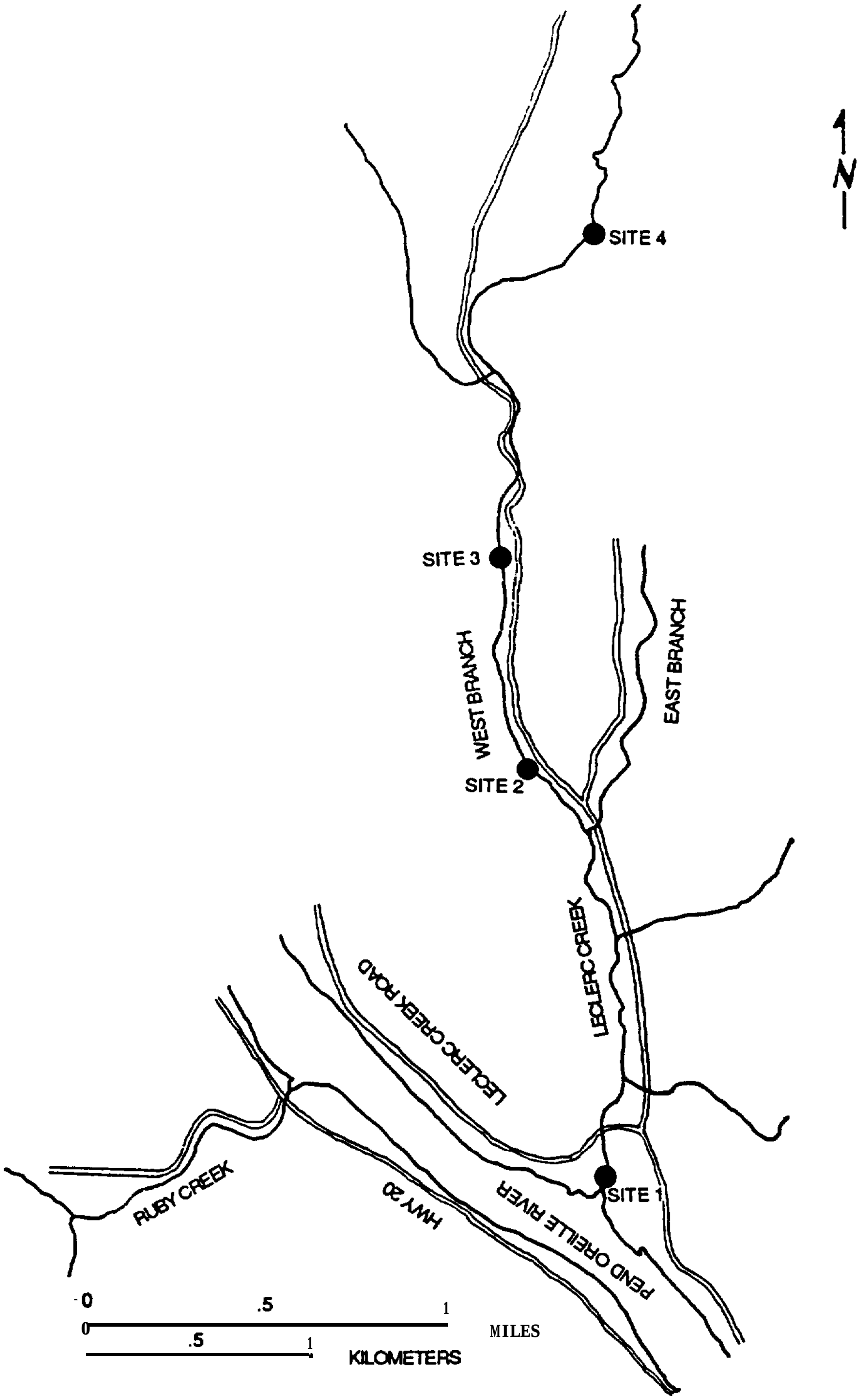

Figure 2.6 Map of LeClerc Creek showing the locations of population study sites.

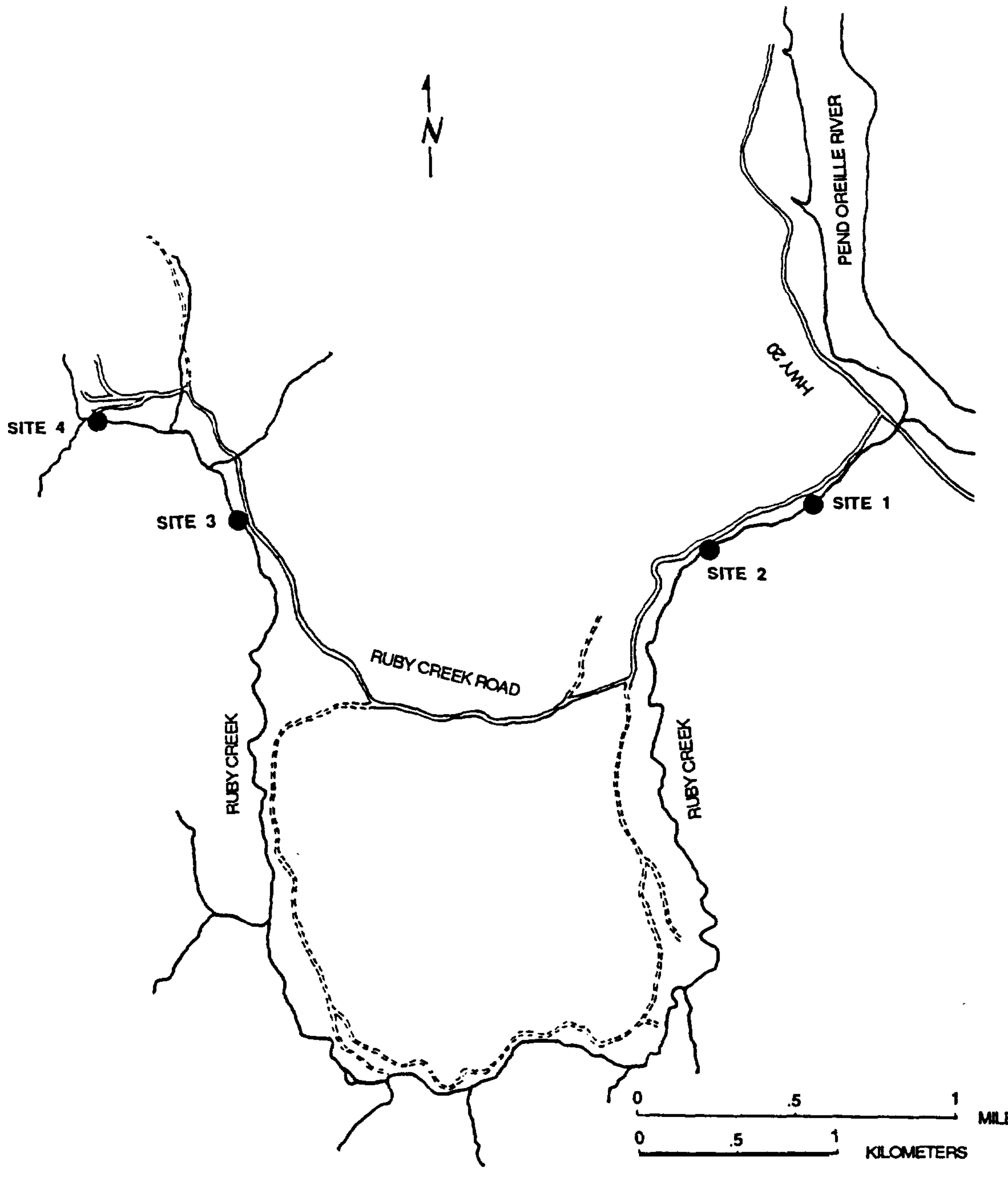

Figure **2.7** Map of Ruby Creek showing the locations of population study sites.

previous pass or to make at least four passes, however, in some cases due to time constraints this goal was not met.

For each reach in which two passes were made, the population was estimated using the following equation of Seber and LeCren (1967):

$$N = \frac{(U_1)^2}{(U_1 - U_2)},$$

where: N = estimated population size;
U_1 = number of fish collected in the first pass; and
U_2 = number of fish collected in the second pass

The standard error of the estimate was calculated by:

$$S.E.(N) = \sqrt{\frac{(U_1)^2(}{(U_1 - U_2)^4}},$$

where: $S.E.(N)$ = standard error of the population estimates; and
T = total number of fish collected $(U_1 + U_2)$.

Ninety-five percent confidence intervals were placed around the estimate by multiplying the standard error by 1.96.

When three or more passes were made in a section, the population was estimated using the methodology of Zippen (1958). The first number needed to use this method was:

$$T = \sum_{i=1}^{n} U_i,$$

where: T = total number of fish collected;
U_i = number of fish collected in the ith removal; and
n = the number of removals.

The ratio (R) was then calculated using the equation:

$$R = \frac{\sum_{i=1}^{n}(i-1)U_i}{T}.$$

The population estimate (N) was then calculated using the equation:

$$N = \frac{T}{Q},$$

where: Q = the proportion of fish captured during all passes. Q was located by using the ratio (R) on the curve found in Fig. 22 of Platts et *al.* (1983).

The standard error of the estimate was calculated by:

$$S.E.(N) = \sqrt{\frac{N(N-T)T}{T^2 - N(N-T)\frac{(kP)^2}{1-P}}},$$

where: P = the estimated probability of capture during a single recapture as found using the ratio (R) on the curve found in Fig. 23 of Platts et *al.* (1983).

Ninety-five percent confidence intervals were placed around the estimate by multiplying the standard error by 1.96.

Width measurements were made at a distance equal to 10 percent of the length of the section. Mean width was then calculated and multiplied by the length to yield the area of the section. Fish density in each section was then calculated.

2.5 AGE, GROWTH, AND CONDITION

The only difference in methodology from Barber et *al.* (1989) was that the number of fish in each age class was equalized before the regression analysis of the body length-scale length was conducted. This was accomplished by randomly selecting an equal number of fish from each age class. If an age class was represented by only a few fish then all were used. It was felt that this method yielded a more reliable intercept value since the regression line was not biased by strong age classes.

2.6 FOOD AVAILABILITY IN THE RIVER, SLOUGHS, AND TRIBUTARIES

2.6.1 BENTHIC MACROINVERTEBRATE DENSITIES IN THE TRIBUTARIES AND INVERTEBRATE ABUNDANCE IN THE DRIFT

The sampling methods were the same as used by Barber et *al.* (1989) in September and October, 1988 when two benthic and two drift samples were collected at an upstream and downstream site except in Tacoma Creek, where two samples were collected in only one area.

All organisms in the benthic samples were manually sorted instead of using sugar floatation which was used in 1988.

2.6.2 BENTHIC MACROINVERTEBRATE DENSITIES IN THE RIVER AND SLOUGHS

Benthic grabs in the river were collected at mid-channel and near each bank instead of at one quarter, half, and three quarters across the river as in 1988. This change was made to better quantify benthic macroinvertebrate densities in the littoral areas where most of the fish are found. Sugar floatation was not used.

2.6.3 ZOOPLANKTON

In addition to the mid-channel tows that were collected during 1988, zooplankton tows were taken in each of the slough study sites and in the littoral areas of each river study site.

Cladoceran biomass was estimated using the length-weight relationships summarized by Downing and Rigler (1984). The values used to calculate biomass are found in Table 2.2. The length-weight relationship for some species of cladocerans found in this study has not been described so their biomass was not estimated.

Table **2.2.** Length-weight relationships for crustacean **zooplankton (Cladocera)** collected from the literature as summarized by Downing and **Rigler (1984).**

Species	*ln* a	b	Range
Bosmina longirostris	2.7116	2.5294	0.28-0.54
Ceriodaphnia quadrangula	2.5623	3.3380	0.30-0.71
Ceriodaphnia reticulata	3.0727	3.29	- - -
Chydorus sphaericus	4.5430	3.636	0.20-0.40
Daphnia ambigua	1.54	2.29	- - -
Daphnia galeata mendotae	1.51	2.56	- - -
Daphnia parvula	1.08	2.16	0.44-1.22
Daphnia pulicaria	2.30	3.10	1.00-2.50
Daphnia schødleri	2.30	3.10	1.00-2.50
Daphnia retrocurva	1.4322	3.129	0.50-2.00
Daphnia thorata	2.64	2.54	0.60-2.20
Diaphanosoma birgei	1.6242	3.0468	0.44-10.44
Diaphanosoma brachyurum	1.6242	3.0468	0.44-10.44
Leptodora kindti	-0.8220	2.670	1.00-5.00
Megafenestra aurita	2.8713	3.079	0.30-0.80
Sida crystallina	2.0539	2.189	0.80-2.30

2.7 FEEDING HABITS

Stomach* samples were collected in March, April, June, July, September, and October, 1989. Mean seasonal feeding habits were obtained by grouping the March-April, June-July, and September-October samples. The seasonal means were averaged to yield the mean annual feeding habits for each age class of each species

The ten stomachs that were collected from the predominant species at each tributary location in 1988 was increased to 20 in 1989.

2.8 FISH MOVEMENT AND MIGRATION

In addition to getting information on fish movement from fish recaptured with numbered Floy tags, information was obtained about changes in length. Fish were grouped according to their age at tagging and the difference between their length at tagging and recapture was calculated. The monthly growth increment was calculated by dividing the length difference by the number of months between tagging and recapture. The mean monthly growth increment was calculated for all fish tagged within a particular age class. The mean annual growth increment was then calculated by multiplying the mean monthly growth increment by 12. Fish with very large (positive or negative) growth increments were assumed to have been incorrectly measured and not used in the mean growth increment.

All other methods were the same as in Barber et *al.* (1989).

3.0 RESULTS

3.1 RELATIVE ABUNDANCE

A total of 90.5 hours were spent collecting relative abundance information by electrofishing from November 1988 through December 1989 resulting in the capture of 17,554 fish (Table 3.1). Yellow perch was the most abundant species making up 45.1 percent of the total catch (Table 3.2). Pumpkinseed was next at 16.5 percent followed by largemouth bass (9.1%), tench (8.3%), mountain whitefish (6.0%), largescale sucker (4.5%), northern squawfish (3.5%), and longnose sucker (3.0%). Salmonids, other than mountain whitefish, were rare with brown trout being the most abundant at 0.7 percent of the total catch.

Yellow perch was the most abundant species at all sites except 1A and 1 1A (Table 3.2). At site 1 A, largescale sucker was the most abundant species making up 45.1 percent of the catch. At site 1 1A pumpkinseed was the most abundant species making up 56.3 percent of the total catch.

Tables 3.3 and 3.4, respectively, show the number and percent of each species of fish caught each month. Yellow perch was the most common species caught in all months except January and March. In January pumpkinseed were most abundant making up 24.7 percent of the catch and in March 52.5 percent of the catch was mountain whitefish. The monthly relative abundance data can be found in Appendix A, Tables A.1-A.26.

Table 3.5 shows the relative abundance of each age class for each species. The fish were grouped by age according to their lengths and the back-calculated lengths at annulus formation. (See section 3.3.2). Of the 1,589 largemouth bass captured 399 (25.1%) were 0+, 391 (24.6%) were 1+, 276 (17.4%) were 2+, and 274 (17.2) were 3+, 74 (4.7%) were 4+, 17 (1.1%) were 5+, 21 (1.3%) were 6+, 28 (1.8%) were 7+, 35 (2.2%) were 8+, 25 (1.6%) were 9+, 9 (0.6%) were 10+, 14 (0.9%) were 11+, 8 (0.5%) were 12+, 7 (0.4%) were 13+, 9 (0.6%) were 14.+, and 2 (0.1%) were 15+. A total of 7,917 yellow perch were captured and 142 (1.8%) were 0+, 101 (1.3%) were 1+, 76 (1 .0%) were 2+, 731 (9.2%) were 3+, 2,474 (31.2%) were 4+, 3,112 (39.3%) were 5+, 1,268 (16.0%) were 6+, 5 (0.1 %) were 7+, and 8 (0.1%) were 8+. The 1,054 mountain whitefish captured consisted of 18 (1.7%) 0+, 62 (5.9%) 1+, 246 (23.3%) 2+, 437 (41.5%) 3+, 287

Table **3.1.** Number of each species of fish caught during relative abundance **electrofishing** at each study site **from** November, **1988** through December, **1989.**

STUDY SITE	1	1A[1]	1C[2]	2	2B[3]	2D[4]	2E[5]		23A	4	24A	5	5A	6	6A	7	8	8A[6]	8C[7]	9	10	11	11A[8]	TOTAL
SHOCK TIME (MIN)	372	9	8	422	47	5	8	403		390		405	252	391	247	404	375	20	33	373	359	372	6	5432
LAKE TROUT				2																				2
RBT X CTT HYBRID	1			2																				3
BULL TROUT																		1						2
CUTTHROAT TROUT	3			1				1				3	1	2			2			2				15
BROWN TROUT	8	1	1	25					33			5	2	4	2	11	8	1		7	5	4		117
BROOK TROUT				2																				2
RAINBOW TROUT	3			6											1		1					1		13
KOKANEE				3				1	3		1		3									1		12
MOUNTAIN WHITEFISH	19	2	2	228		2		33	64	43	8	66	2	79	72	38	49		2	64	114	167		1054
LARGEMOUTH BASS	64	3	5	73	58	1	5	58	23	64	209	76	382	51	102	102	97	2	9	86	90	28	1	1589
BLACK CRAPPIE	10	1		5	19			10	21	6	83	1	31		1	11	9		5	6	5	4	5	233
PUMPKINSEED	38	3	2	42	36	2	4	186	62	151	271	279	614	138	357	161	93	12	20	110	115	174	27	2897
YELLOW PERCH	158	7	15	280	121	12	14	427	248	506	1349	785	907	414	381	459	400	20	113	521	536	240	4	7917
LONGNOSE SUCKER	3	1		21		1	2	26	133	30	19	13	20	16	43	21	31	17	30	40	36	27		530
LARGESCALE SUCKER	106	23	8	196	4	2	1	42	47	42	12	54	7	29	24	37	38	10	5	34	35	32	1	789
BROWN BULLHEAD	10			7	8	2	2	22	8	47	18	15	21	5	10	6	3		18	3	7	7		219
								67																
TENCH	14		1	51	50		7	21	46	102	217	87	109	91	109	93	60	2	46	73	172	60	8	1465
NORTHERN SQUAWFISH	108	5	9	155	9		3		35	11	28	8	5	11	8	19	25	8	3	35	52	62		620
PEAMOUTH	3	5		11				3	11	2	3	1	2	2		3	3		6	2	1	2	2	62
REDSIDE SHINER	2																							2
SCULPIN				10																		1		11
TOTAL	550	51	43	1120	305	22	38	897	736	1004	2218	1393	2106	842	1110	961	819	73	257	983	1168	810	48	17554

[1] Mouth of Renshaw Creek, sampled in July
[2] Mouth of Lost Creek, sampled in July
[3] Sampled in June and July
[4] Mouth of Ruby Creek, sampled in July
[5] Mouth of Middle Creek, sampled in July
[6] Sampled in March and September
[7] Sampled in April
[8] Sampled in November, 1988

Table **3.2.** Percent of each species of fish caught during relative abundance **electrofishing** surveys at each study site from November, **1988** through December, **1989.**

STUDY SITE	1	1A	1C	2	2B	2D	2E	3	3A	4	4A	5	5A	6	6A	7	8	8A	8C	9	10	11	11A	TOTAL
LAKE TROUT				0.2																				0.01
RBT X CTT HYBRID	0.2			0.2																				0.02
BULL TROUT				0.2					0.1									1.4						0 01
CUTTHROAT TROUT	0.5			0.1				0.1				0.2	0.0	0.2			0.2			0.2				0.1
BROWN TROUT	1.5	2.0	2.3	2.2					4.5			0 4	0.1	0.5	0.2	1.1	1.0	1.4		0.7	0 4	0 5		0 7
BROOK TROUT				0.2																				0.01
RAINBOW TROUT	0.5			0.5					0.1						0.1		0.1					0.1		0.1
KOKANEE				0.3				0.1	0 4				0.1									0.1		0 1
MOUNTAIN WHITEFISH	3.5	3.9	4.7	20.4		9.1		3.7	8.7	4.3	0.4	4.7	0.1	9.4	6.5	4.0	6.0		0.8	6 5	9.8	20.6		6.0
LARGEMOUTH BASS	1.6	5.9	11.6	6 5	19.0	4.5	13.2	6.5	3.1	6.4	9.4	5.5	18.1	6.1	9.2	10.6	11.8	2 7	3.5	8.7	7 7	3 5	2.1	9.1
BLACK CRAPPIE	1 8	2.0		0.4	6.2			1.1	2.9	0.6	3.7	0.1	1.5		0.1	1.1	1.1		1.9	0 6	0.4	0.5	10 4	1 3
PUMPKINSEED	6.9	5.9	4.7	3.8	11.8	9.1	10.5	20.7	8.4	15.0	12.2	20.0	29.2	16.4	32.2	16.8	11.4	16.4	7.8	11.2	9 8	21.5	56 3	16 5
YELLOW PERCH	8.7	13.7	34.9	25.0	39.7	54.5	36.8	47.6	33.7	50.4	60.8	56.4	43.1	49.2	34.3	47.8	48.8	27.4	44.0	53.0	45.9	29 6	8 3	45 1
LONGNOSE SUCKER	0.5	2.0		1.9		4.5	5.3	2.9	18.1	3.0	0.9	0.9	0.9	1.9	3.9	2.2	3 8	23 3	11.7	4.1	3.1	3.3		3.0
LARGESCALE SUCKER	9.3	45.1	18.6	17.5	1.3	9.1	2.6	4.7	6.4	4 2	0 5	3.9	0.3	3.4	2.2	3.9	4.6	13.7	1.9	3.5	3.0	4.0	2 1	4.5
BROWN BULLHEAD	1.8			0.6	2.6	9.1	5.3	2.5	1.1	4.7	0 8	1.1	1.0	0.6	0.9	0 6	0 4		7.0	0.3	0.6	0.9		1.2
TENCH	2.5		2.3	4.6	16.4		18.4	7.5	6.2	10.2	9.8	6.2	5.2	10.8	9.8	9.7	7 3	2.7	17.9	7.4	14.7	7.4	16.7	8.3
NORTHERN SQUAWFISH	9.6	9.8	20.9	13.8	3.0		7.9	2.3	4.7	1.1	1.3	0.6	0.2	1.3	0.7	2 0	3 1	11.0	1.2	3.6	4.5	7.7		3 5
PEAMOUTH	).5	9.8		1.0				0.3	1.5	0.2	0.1	0 1	0.1	0.2		0.3	0.4		2.3	0.2	0 1	0.2	4 2	0.4
REDSIDE SHINER	0.4																							0 01
SCULPIN																								

Table **3.3.** Number of each species of fish caught during relative abundance **electrofishing** surveys during each month.

MONTH	11/88	12/88	1/89	3/89	4/89	5/89	6/89	7/89	8/89	9/89	10/89	11/89	12/89	TOTAL
SHOCK TIME (MIN)	420	336	417	335	506	441	518	436	387	440	436	370	390	5,432
LAKE TROUT		1						2						2
RBT X CTT HYBRID								2						3
BULL TROUT										2				2
CUTTHROAT TROUT		4	1	2	3	5								15
BROWN TROUT	7	7	2	6	11	28	7	15	18	13	1	1	1	117
BROOK TROUT	1						1							2
RAINBOW TROUT	2			1		4	2	2	1		1			13
KOKANEE				1	1	5	2		1	1		1		12
MOUNTAIN WHITEFISH	44	46	51	210	159	163	66	124	29	15	51	34	62	1,054
LARGEMOUTH BASS	98	48	32	23	88	102	333	156	207	250	196	35	21	1,589
BLACK CRAPPIE	15	14	11	2	58	11	39	17	15	33	6	8	4	233
PUMPKINSEED	269	95	108	4	128	218	824	285	258	406	202	76	24	2,897
YELLOW PERCH	626	354	53	14	1553	428	1416	928	793	785	730	138	99	7,917
LONGNOSE SUCKER	60	31	33	27	56	43	41	41	56	41	61	19	21	530
LARGESCALE SUCKER	64	32	51	64	142	69	123	81	48	39	39	22	15	789
BROWN BULLHEAD	24	22	13	19	26	5	32	15	11	19	24	4	5	219
TENCH	196	68	52	19	101	76	210	166	128	172	100	126	51	1,465
NORTHERN SQUAWFISH	106	46	24	5	30	31	98	60	57	38	77	41	7	620
PEAMOUTH	4	2		3	16	6	5	17	2		2	4	1	62
REDSIDE SHINER	1								1					2
SCULPIN	1	3	7											11
TOTAL	1,518	773	438	400	2,372	1,194	3,199	1,911	1,625	1,814	1,490	509	311	17,554

Table **3.4.** Percent of each species of fish caught during relative abundance **electrofishing** surveys during each month.

MONTH	11/88	12/88	1/89	3/89	4/89	5/89	6/89	7/89	8/89	9/89	10/89	11/89	12/89	TOTAL
LAKE TROUT								0.1						0.01
RBT X CTT HYBRID		0.1						0.1						0.02
BULL TROUT								0.1		0.1				0.02
CUTTHROAT TROUT		0.5	0.2	0.5	0.1	0.4								0.1
BROWN TROUT	0.5	0.9	0.5	1.5	0.5	2.3	0.2	0.8	1.1	0.7	0.1	0.2	0.3	0.7
BROOK TROUT	0.1													0.01
RAINBOW TROUT	0.1			0.3		0.3	0.1	0.1	0.1		0.1			0.1
KOKANEE				0.3		0.4	0.1		0.1	0.1		0.2		0.1
MOUNTAIN WHITEFISH	2.9	6.0	11.6	52.5	6.7	13.7	2.1	6.5	1.8	0.8	3.4	6.7	19.9	6.0
LARGEMOUTH BASS	6.5	6.2	7.3	5.8	3.7	8.5	10.4	8.2	12.7	13.8	13.2	6.9	6.8	9.1
BLACK CRAPPIE	1.0	1.8	2.5	0.5	2.4	0.9	1.2	0.9	0.9	1.8	0.4	1.6	1.3	1.3
PUMPKINSEED	17.7	12.3	24.7	1.0	5.4	18.3	25.8	14.9	15.9	22.4	13.6	14.9	7.7	16.5
YELLOW PERCH	41.2	45.8	12.1	3.5	65.5	35.8	44.3	48.6	48.8	43.3	49.0	27.1	31.8	45.1
LONGNOSE SUCKER	4.0	4.0	7.5	6.8	2.4	3.6	1.3	2.1	3.4	2.3	4.1	3.7	6.8	3.0
LARGESCALE SUCKER	4.2	4.1	11.6	16.0	6.0	5.8	3.8	4.2	3.0	2.1	2.6	4.3	4.8	4.5
BROWN BULLHEAD	1.6	2.8	3.0	4.8	1.1	0.4	1.0	0.8	0.7	1.0	1.6	0.8	1.6	1.2
TENCH	12.9	8.8	11.9	4.8	4.3	6.4	5.9	8.7	7.9	9.5	6.7	24.8	16.4	8.3
NORTHERN SQUAWFISH	7.0	6.0	5.5	1.3	1.3	2.6	3.7	3.1	3.5	2.1	5.2	8.1	2.3	3.5
PEAMOUTH	0.3	0.3		0.8	0.7	0.5	0.2	0.9	0.1		0.1	0.8	0.3	0.4
REDSIDE SHINER	0.1								0.1					0.01
SCULPIN	0.1	0.4	1.6											0.1

Table **3.5.** Total number and relative abundance **(%)** of each age class of each species caught during relative abundance **electrofishing** surveys on the **Pend Oreille** River from November, **1988** through December, **1989.**

Age	Largemouth bass	Yellow perch	Mountain whitefish	Black crappie	Brown trout	Cutthroat trout	Rainbow trout	Kokanee	Pumpkin-seed	Tench	Northern squawfish	Largescale sucker	Longnose sucker	Peamouth
0+	399(25.1)	142 (1.8)	18 (1.7)	32 (13.7)	4 (3.4)		1 (7.7)	2 (16.7)	106 (3.7)	59 (4.0)	10 (1.6)	9 (1.1)	10 (1.9)	7 (11.3)
1+	391(24.6)	101 (1.3)	62 (5.9)	7 (3.0)	23 (19.7)	1 (6.7)	4 (30.8)	2 (16.7)	188 (6.5)	69 (4.7)	12 (1.9)	3 (0.4)	4 (0.8)	3 (4.8)
2+	276(17.4)	76 (1.0)	246(23.3)	12 (5.2)	19 (16.2)	5 (33.3)	3 (23.1)	4 (33.3)	210 (7.2)	80 (5.5)	143(23.1)	2 (0.3)	6 (1.1)	12 (19.4)
3+	274(17.2)	731 (9.2)	437(41.5)	51 (21.9)	25 (21.4)	3 (20.0)	4 (30.8)	4 (33.3)	418(14.4)	136 (9.3)	245(39.5)	18 (2.3)	39 (7.4)	5 (8.1)
4+	74 (4.7)	2474(31.2)	287(27.2)	53 (22.7)	8 (6.8)	4 (26.7)	1 (7.7)		595(20.5)	174(11.9)	128(20.6)	27 (3.4)	116(21.9)	14 (22.6)
5+	17 (1.1)	3112(39.3)	4 (0.4)	60 (25.8)	5 (4.3)	2 (13.3)			713(24.6)	221(15.1)	61 (9.8)	73 (9.3)	49 (9.2)	21 (33.9)
6+	21 (1.3)	1268(16.0)		9 (3.9)	8 (6.8)				555(19.2)	284(19.4)	10 (1.6)	173(21.9)	39 (7.4)	
7+	28 (1.8)	5 (0.1)		5 (2.1)	9 (7.7)				84 (2.9)	336(22.9)	3 (0.5)	141(17.9)	267(50.4)	
8+	35 (2.2)	8 (0.1)		4 (1.7)	16 (13.7)				28 (1.0)	106 (7.2)	2 (0.3)	181(22.9)		
9+	25 (1.6)										4 (0.6)	100(12.7)		
10+	9 (0.6)										2 (0.3)	52 (6.6)		
11+	14 (0.9)											10 (1.3)		
12+	8 (0.5)													
13+	7 (0.4)													
14+	9 (0.6)													
15+	2 (0.1)													

(27.2%) 4+, and 4 (0.4%) 5+. Of the 233 black crappie captured 32 (13.7%) were 0+, 7 (3.0%) were 1+, 12 (23.3%) were 2+, 51 (21.9%) were 3+, 53 (22.7%) were 4+, 60 (25.8%) were 5+, 9 (3.9%) were 6+, 5 (2.1%) were 7+, and 4 (1.7%) were 8+. A total of 117 brown trout were captured and 4 (3.4%) were 0+, 23 (19.7%) were 1 +, 19 (16.2%) were 2+, 25 (21.4%) were 3+, 8 (6.8%) were 4+, 5 (4.3%) were 5+, 8 (6.8%) were 6+, 9 (7.7%) were 7+, and 16 (13.7%) were 8+. The 15 cutthroat trout consisted of 0 (0.0%) 0+, 1 (6.7%) 1+, 5 (33.3%) 2+, 3 (20.0%) 3+, 4 (26.7%) 4+, and 2 (13.3%) 5+. Of the 13 rainbow trout captured 1 (7.7%) was 0+, 4 (30.8%) were 1+, 3 (23.1%) were 2+, 4 (30.8%) were 3+, and 1 (7.7%) was 4+. A total of 12 kokanee were caught and 2 (16.7%) were 0+, 2 (16.7%) were 1+, 4 (33.3%) were 2+, and 4 (33.3%) were 3+.

The 2,897 pumpkinseeds captured consisted of 106 (3.7%) 0+, 188 (6.5%) 1+, 210 (7.2%) 2+, 418 (14.4%) 3+, 595 (20.5%) 4+, 713 (24.6%) 5+, 555 (19.2%) 6+, 84 (2.9%) 7+, and 28 (1.0%) 8+. Of the 1,465 tench captured 59 (4.0%) were 0+, 69 (4.7%) were 1+, 80 (5.5%) were 2+, 136 (9.3%) were 3+, 174 (11.9%) were 4+, 221 (15.1%) were 5+, 284 (19.4%) were 6+, 336 (22.9%) were 7+, and 106 (7.2%) were 8+. A total of 620 northern squawfish were captured and 10 (1.6%) were 0+, 12 (1.9%) were 1+, 143 (23.1%) were 2+, 245 (39.5%) were 3+, 128 (20.6%) were 4+, 61 (9.8%) were 5+, 10 (1.6%) were 6+, 3 (0.5%) were 7+, 2 (0.3%) were 8+, 4 (0.6%) were 9+, and 2 (0.3%) were 10+. The 789 largescale suckers captured consisted of 9 (1.1%) 0+, 3 (0.4%) 1+, 2 (0.3%) 2+, 18 (2.3%) 3+, 27 (3.4%) 4+, 73 (9.3%) 5+, 173 (21.9%) 6+, 141 (17.9%) 7+, 181 (22.9%) 8+, 100 (12.7%) 9+, 52 (6.6%) 10+, and 10 (1.3%) 11+. Of the 530 longnose suckers captured 10 (1.9%) were 0+, 4 (0.8%) were 1+, 6 (1 .1%) were 2+, 39 (7.4%) were 3+, 116 (21.9%) were 4+, 49 (9.2%) were 5+, 39 (7.4%) were 6+, and 267 (50.4%) were 7+. A total of 62 peamouth were captured and 7 (11.3%) were 0+, 3 (4.8%) were 1+, 12 (19.4%) were 2+, 5 (8.1%) were 3+, 14 (22.6%) were 4+, and 21 (33.9%) were 5+. The relative abundance for each age class by month can be found in Appendix A, Tables A.27 through A.56.

Gill netting resulted in the capture of 75 fish in 314 hours of net sets (Table 3.6). Pumpkinseed was the most abundant species in the nets with 24 (32.0%) followed by peamouth with 14 (18.7%) and northern squawfish with 11 (14.7%). Other species caught in the nets included largescale sucker (8.0%), mountain whitefish (6.7%), yellow perch (6.7%), tench (5.3%), longnose sucker (2.7%), cutthroat

Table **3.6.** Total number and relative abundance **(%)** of each species caught during gill net surveys on the **Pend Oreille** River from November, **1988** through December, **1989.**

MONTH	11/88	12/88	1/89	3/89	4/89	5/89	6/89	7/89	8/89	10/89	11/89	12/89	Total
SOAK TIME (HOURS)	27.9	31.1	56.4	42.5	21.9	9.3	27.4	21.5	18.1	32.6	9.1	16	313.8
CUTTHROAT TROUT						1 (33.3)							1 (1.3)
BROWN TROUT									1 (16.7)				1 (1.3)
MOUNTAIN WHITEFISH			1 (50.0)				1 (3.2)	2 (12.5)	1 (16.7)				5 (6.7)
LARGEMOUTH BASS							1 (3.2)						1 (1.3)
BLACK CRAPPIE					1 (25.0)								1 (1.3)
PUMPKINSEED						1 (33.3)	20 (64.5)	2 (12.5)	1 (16.7)				24 (32.0)
YELLOW PERCH					1 (25.0)			4 (25.0)					5 (6.7)
LONGNOSE SUCKER				1 (50.0)			1 (3.2)						2 (2.7)
LARGESCALE SUCKER	4 (100.0)	1 (33.3)	1 (50.0)										6 (8.0)
TENCH							2 (6.5)	1 (6.3)	1 (16.7)				4 (5.3)
NORTHERN SQUAWFISH		2 (66.7)		1 (50.0)	1 (25..0)			3 (18.8)	1 (16.7)	3 (75.0)			11 (14.7)
PEAMOUTH					1 (25.0)	1 (33.3)	6 (19.4)	4 (25.0)	1 (16.7)	1 (25.0)			14 (18.7)
TOTAL	4	3	2	2	4	3	31	16	6	4	0	0	75

trout (1.3%), brown trout (1.3%), largemouth bass (1.3%), and black crappie (1.3%).

Beach seining resulted in the capture of 805 fish in 655.5 meters (Table 3.7). Pumpkinseed was the most abundant species making up 59.6 percent of the catch followed by largemouth bass (23.2%), tench (7.8%), yellow perch (7.6%), black crappie (1.6%), and brown bullhead (0.1%). Table 3.8 shows the breakdown of the beach seine data by age. Young-of-the-year fish accounted for 100 percent of the black crappie, 98.9 percent of the largemouth bass, 80.2 percent of the pumpkinseed, 100 percent of the tench, and 77.0 percent of the yellow perch. The number and percent of each species captured each month can be found in Appendix A, Tables A.57 through A.59.

In 12 hours of selective electrofishing, 790 fish were captured (Table 3.9). Largemouth bass made up 77.8 percent of the catch followed by black crappie (11.9%), brown trout (4.1%), and mountain whitefish (3.9%). Cutthroat trout, rainbow trout, kokanee, bull trout, brook trout, and lake trout each accounted for less than one percent of the catch.

3.2 POPULATION ESTIMATES

3.2.1 RIVER AND SLOUGHS

The estimated populations for one year and older fish between Box Canyon and Albeni Falls Dams can be found in Table 3.10. A total of 4,771 yellow perch were captured, 4,039 were released with marks, and 27 were subsequently recaptured (Appendix B, Table B.1). The estimated population for yellow perch was 6,010,448 with a lower 95 percent confidence limit of 4,139,850 and an upper limit of 9,116,972. A total of 2,123 pumpkinseeds were captured, 1,853 were marked, and 8 recaptured (Appendix B, Table B.2). This gave an estimated population of 3,889,758 with a lower limit of 1,969,498 and an upper limit of 9,152,371. A total of 910 tench were captured, 802 released with marks, and 6 recaptured (Appendix B, Table B.3). The estimated population for tench was 1,085,921 with a lower 95 percent confidence limit of 497,368 and an upper limit of 2,961,603. A total of 910 largemouth bass were captured, 612 marked, and 8 recaptured (Appendix B, Table B.4). This yielded an estimated population of 590,906 with a lower limit of 399,193 and an upper limit of 1,390,366. A total of 376 northern squawfish

Table **3.7.** Number and percent of each species of fish caught by beach seining during July through September, **1989.**

MONTH	JULY	AUGUST	SEPTEMBER	TOTAL
DISTANCE SEINED (M)	320	183	152.5	655.5
LARGEMOUTH BASS	160 (53.0)	19 (9.4)	8 (2.7)	187 (23.2)
PUMPKINSEED	137 (45.4)	106 (52.2)	237 (79.0)	480 (59.6)
BLACK CRAPPIE		2 (1.0)	11(3.7)	13 (1.6)
YELLOW PERCH	4 (1.3)	13 (6.4)	44 14.7)	61 (7.6)
TENCH		63 (31.0)		63 (7.8)
BROWN BULLHEAD	1 (0.3)			1 (0.1)
TOTAL	302	203	300	805

Table **3.8.** Number and percent of each age class of each species of fish collected during beach seine surveys.

		7/89	8/89	9/89	Total
Black crappie	0+		2 (100.0)	11 (100.0)	13 (100.0)
Largemouth bass	0+	158 (98.8)	19 (100.0)	8 (100.0)	185 (98.9)
	1+	2 (1.3)			2 (1.1)
Pumpkinseed	0+	76 (55.5)	101 (95.3)	209 (88.2)	385 (80.2)
	1+	42 (30.7	4 (3.8)	14 (5.9)	60 (12.5)
	2+	4 (2.9)		8 (3.4)	12 (2.5)
	3+	6 (4.4)	1 (0.9)	1 (0.4)	8 (1.7)
	4+	3 (2.2)		2 (0.8)	5 (1.0)
	5+	6 (4.4)			6 (1.2)
	6+			3 (1.3)	3 (0.6)
Tench	0+		63 (100.0)		63 (100.0)
Yellow perch	0+	4 (100.0)	13 (100.0)	30 (68.2)	47 (77.0)
	1+			9 (20.5)	9 (14.8)
	2+				
	3+			2 (4.5)	2 (3.3)
	4+				
	5+			3 (6.8)	3 (4.9)

Table 3.9. Number and percent abundance of each target species captured during selective **electrofishing** surveys during **1989.**

LOCATION	1A [1]	1B [2]	1C [3]	2B [4]	3A [5]	4A [6]	4B [7]	5B [8]	8A [9]	8C [10]	9A [11]	10A [12]	CAMPBELL SLOUGH [13]	CEDAR CREEK MOUTH [14]	MIDDLE CREEK MOUTH [15]	MILL CREEK MOUTH [16]	TOTAL
SHOCK TIME	23	126	23	193	18	10	20	26	55	54	27	19	90	10	14	5	713
LARGEMOUTH BASS	5 (55.6)	79 (68.7)	13 (81.3)	200 (95.7)		7 (87.5)	12 (60.0)	15 (88.2)	4 (20.0)	49 (71.0)	87 (90.6)	19 (55.9)	116 (80.0)		9 (81.8)		615 (77.8)
MOUNTAIN WHITEFISH	3 (33.3)	2 (1.7)	1 (6.3)		3 (17.6)				3 (15.0)	12 (17.4)		6 (17.6)			1 (9.1)		31 (3.9)
BLACK CRAPPIE	1 (11.1)	31 (27.0)		9 (4.3)		1 (12.5)	8 (40.0)	2 (11.8)		4 (5.8)	7 (7.3)	1 (2.9)	29 (20.0)	1 (50.0)			94 (11.9)
BROWN TROUT					14 (82.4)				12 (60.0)	4 (5.8)		2 (5.9)					32 (4.1)
CUTTHROAT TROUT			1 (6.3)								1 (1.0)	2 (5.9)					4 (0.5)
RAINBOW TROUT		3 (2.6)	1 (6.3)						1 (5.0)							1 (50.0)	6 (0.8)
KOKANEE											1 (1.0)	1 (2.9)					2 (0.3)
BULL TROUT												3 (8.8)					3 (0.4)
BROOK TROUT														1 (50.0)	1 (9.1)		2 (0.3)
LAKE TROUT																1 (50.0)	1 (0.1)
TOTAL	9	115	16	209	17	8	20	17	20	69	96	34	145	2	11	2	790

1 Sampled in August and September
2 Sampled in May, June, and September
3 Sampled in August and September
4 Sampled in June
5 Sampled in July and August
6 Sampled in April
7 Sampled in April
8 Sampled in June
9 Sampled in July and August
10 Sampled in May
11 Sampled in May
12 Sampled in August
13 Sampled in June
14 Sampled in August
15 Sampled in August, September, and October
16 Sampled in August, September, and October

were captured, 315 released with marks, and 4 were recaptured (Appendix B, Table B.5). The estimated population for northern squawfish was 248,988 with a lower 95 percent confidence limit of 97,642 and an upper limit of 995,950.

Three hundred and sixty largescale suckers were captured, 308 marked and released, and 5 were recaptured (Appendix B, Table B.6). This yielded a population estimate of 186,693 with a lower limit of 79,783 and an upper limit of 583,416. A total of 274 longnose suckers were captured, 219 released with marks, and 3 were subsequently recaptured (Appendix B, Table B.7). The estimated population for longnose suckers was 183,457 with a lower 95 percent confidence limit of 62,542 and an upper limit of 917,286. A total of 391 mountain whitefish were captured, 215 marked and released, and 5 recaptured (Appendix B, Table B.8). The estimated population for mountain whitefish was 163,890 with lower and upper 95 percent confidence limits of 70,038 and 512,1 56, respectively. One hundred and eleven brown bullheads were captured, 53 were marked and released, and one was recaptured (Appendix B, Table B.9). The estimated population for brown bullhead was 36,200 with a lower limit of 6,464 and an upper limit of 362,001. A total of 85 brown trout were captured, 66 marked and released, and 5 recaptured (Appendix B, Table B.10). The population estimate for brown trout was 7,264 with the lower 95 percent confidence limit at 3,104 and the upper limit at 22,701.

Population estimates for specific locations can be found in Table 3.11. Largemouth bass populations were estimated using a Petersen estimate at site 2B (Gardiner Slough) and Campbell Slough on June 21 and 23, 1989. At site 2B, 85 largemouth bass were marked on June 21. On June 23, 115 were captured with 2 having marks, giving a population estimate of 4087 ± 6636. At Campbell Slough, 41 were marked on June 21, 75 caught on June 23 with 3 having marks, giving an estimate of 1025 ± 1095. Brown trout population was estimated using a Schnabel estimate at site 3A and site 8A. Forty-four brown trout were captured in site 3A, 39 were marked, and 3 recaptured (Appendix B, Table B.11). This yielded an estimated population of 198 with a lower 95 percent confidence limit of 58 and an upper confidence limit of 593. A total of 13 brown trout were captured at site 8A, 11 were marked, and 2 were subsequently recaptured (Appendix B, Table B.12). The estimated population for brown trout at site 8A was 23 with a lower limit of 5 and an upper limit of 46.

Table 3.10. Population estimates and 95 percent confidence limits for one year and older fish in the Pend Oreille River between Albeni Falls and Box Canyon Dams.

	ESTIMATED POPULATION	95 PERCENT CONFIDENCE LIMITS LOWER LIMIT	UPPER LIMIT
Yellow perch	6,010,448	4,139,850	9,116,972
Pumpkinseed	3,889,758	1,969,498	9,152,371
Tench	1,085,921	497,368	2,961,603
Largemouth bass	590,906	299,193	1,390,366
Northern squawfish	248,988	97,642	995,950
Largescale sucker	186,693	79,783	583,416
Longnose sucker	183,457	62,542	917,286
Mountain whitefish	163,890	70,038	512,156
Brown bullhead	36,200	6,464	362,001
Brown trout	7,264	3,104	22,701

Table 3.11. Population estimates and 95 percent confidence limits for one year and older fish at specific areas of the Pend Oreille River.

	LOCATION	EST. POP.	95 PERCENT CONFIDENCE LIMITS LOWER LIMIT	UPPER LIMIT
Largemouth bass	2B	4,887	0	11,523
Largemouth bass	Campbell Slough	1,025	0	2,120
Brown trout	3A	198	58	593
Brown trout	8A	23	5	46

3.2.2 TRIBUTARIES

3.2.2.1 SKOOKUM CREEK

The number of fish caught in each pass and reach measurements can be found in Appendix B, Table B.13. The highest density of brown trout was 80.9 ± 6.5 fish/100 m^2 at reach 2 (Table 3.12). Brook trout density was highest at reach 4 at 50.7 ± 4.7 fish/l 00 m^2. The highest density of cutthroat trout was 2.1 ± 1.5 fish/100 m^2 at reach 3. Of the brown trout caught during population estimation, 46.3 percent were 0+, 30.0 percent were 1+, 10.8 percent were 2+, 6.4 percent were 3+, 1.5 percent were 4+, and 4.9 percent were 5+ (Table 3.13). The brook trout caught during population estimation were composed of 50.3 percent 0+, 29.3 percent 1+, 12.8 percent 2+, and 7.6 percent 3+. Of the cutthroat trout captured, 25.0 percent were 0+, 62.5 percent were 1+, and 12.5 percent were 2+.

3.2.2.2 CEE CEE AH CREEK

The number of fish caught in each pass and reach measurements can be found in Appendix B, Table B.14. The highest density of brown trout was in reach 2 with 35.6 ± 7.1 fish/100 m^2 (Table 3.14). Brook trout were most abundant in reach 4 at 34.0 ± 5.7 fish/100 m^2. Cutthroat trout were only found in reach 3 and had a density of 13.2 ± 8.2 fish/i 00 m^2. Of the brown trout caught during population estimation, 20.9 percent were 0+, 44.0 percent were 1+, 22.6 percent were 2+, 7.3 percent were 3+, and 5.1 percent were 4+ (Table 3.15). Brook trout caught during population estimation were composed of 44.3 percent 0+, 46.2 percent 1+, and 9.4 percent 2+. Cutthroat trout were 79.3 percent 0+, 17.2 percent 1+, and 3.4 percent 2+.

3.2.2.3 TACOMA CREEK

The number of fish caught in each pass and reach measurements can be found in Appendix B, Table B.15. The highest density of brook trout was 26.3 ± 1 .1 fish/100 m^2 in reach 2 (Table 3.16). The highest density of cutthroat trout was found in reach 4 with 4.5 ± 2.6 fish/100 m^2. Of the brook trout caught during population estimation, 30.1 percent were 0+, 46.7 percent were 1+, and 23.2 percent were 2+ (Table 3.17). Cutthroat trout captured during population estimation were composed of 28.4 percent 0+, 23.9 percent 1+, 40.3 percent 2+, and 7.5 percent 3+.

Table **3.12.** Estimated population, **95%** confidence intervals, and fish density for each species of fish captured in **Skookum** Creek at each reach on September **27, 1989.**

SPECIES	EST. POP.	95% C.I.	#/100m^2±95%C.I.
REACH **#1 (91.5 m)**			
Brown trout	16.3	2.9	2.8±0.5
REACH **#2 (91.5 m)**			
Brown trout	196.3	15.8	80.9±6.5
Brook trout	25.9	2.8	10.7±1.2
REACH **#3 (91.5 m)**			
Brown trout	12.0	11.8	3.0±3.0
Brook trout	43.6	10.4	11.0±2.6
Cutthroat trout	8.3	5.8	2.1±1.5
REACH **#4 (91.5 m)**			
Brook trout	275.5	25.8	50.7±4.7
Cutthroat trout	≥1	0	0.2±0

Table **3.13.** Age distribution of trout collected during population estimation in **Skookum** Creek. Age/length relationship was determined by back-calculation of the length at **annulus** formation.

BROWN TROUT						
Age	0+	1+	2+	3+	4+	5+
Size range	≤76	77-133	134-178	179-204	205-218	≥219
Number caught	94	61	22	13	3	10
Percent caught	46.3	30.0	10.8	6.4	1.5	4.9
BROOK TROUT						
Age	0+	1+	2+	3+		
Size range	≤88	89-136	137-153	≥154		
Number caught	153	89	39	23		
Percent caught	50.3	29.3	12.8	7.6		
CUTTHROAT TROUT						
Age	0+	1+	2+	3+		
Size range	≤100	101-139	140-181	≥182		
Number caught	2	5	1	0		
Percent caught	25.0	62.5	12.5			

Table **3.14.** Estimated population, **95%** confidence intervals, and fish density for each species of fish captured in **Cee Cee** Ah Creek at each reach on September **26** and **28, 1989.**

SPECIES	POP. EST.	95% C.I.	#/100m^2±95%C.I.
REACH **#1 (91.4 m)**			
Brown trout	87.5	21.2	25.7±6.2
Sculpin	116.4	79.0	34.2±23.2
REACH **#2 (109.7 m)**			
Brown trout	193.1	38.5	35.6±7.1
REACH **#3 (91.4 m)**			
Brown trout	12.5	2.3	4.1±0.8
Brook trout	36.6	28.8	12.0±9.5
Cutthroat trout	40.1	24.8	13.2±8.2
REACH **#4 (91.4 m)**			
Brook trout	79.5	13.3	34.0±5.7

Table **3.15.** Age distribution of trout collected during population estimation in **Cee Cee** Ah Creek. Age/length relationship was determined by back-calculation of the length at **annulus** formation.

BROWN TROUT					
Age	0 +	1 +	2 +	3 +	4 +
Size range	≤67	68-120	121-176	177-239	≥240
Number caught	49	103	53	17	12
Percent caught	20.9	44.0	22.6	7.3	5.1
BROOK TROUT					
Age	0 +	1 +	2 +		
Size range	≤86	87-143	≥144		
Number caught	47	49	10		
Percent caught	44.3	46.2	9.4		
CUTTHROAT TROUT					
Age	0 +	1 +	2 +		
Size range	≤93	94-133	≥134		
Number caught	23	5	1		
Percent caught	79.3	17.2	3.4		

Table **3.16.** Estimated population, **95%** confidence intervals, and fish density for each species of fish captured in Tacoma Creek at each reach on September 7 and **28, 1989.**

SPECIES	EST. POP	95% C.I.	#/100m^2±95%C.I.
REACH **#1 (61 .0 m)**			
Brook trout	94.4	9.8	21.8±2.3
Cutthroat trout	14.3	4.3	3.3±1.0
REACH **#2 (61.0** ml			
Brook trout	91.a	3.9	26.3±1.1
Cutthroat trout	15.0	0	4.3±1.1
REACH **#3 (91.5 m)**			
Brook trout	125.5	8.1	20.7±1.3
Cutthroat trout	21.6	2.2	3.6±0.4
REACH **#4 (91.5 m)**			
Brook trout	58.8	a.1	11.0±1.5
Cutthroat trout	24.1	13.6	4.5±2.6

Table **3.17.** Age distribution of trout collected during population estimation in Tacoma Creek. Age/length relationship was determined by back-calculation of the length at **annulus** formation.

BROOK TROUT				
Age	0+	1+	2+	
Size range	≤79	80-128	≥129	
Number caught	105	163	81	
Percent caught	30.1	46.7	23.2	
CUTTHROAT TROUT				
Age	0+	1+	2+	3+
Size range	≤100	100-139	140-181	≥181
Number caught	19	16	27	5
Percent caught	28.4	23.9	40.3	7.5

3.2.2.4 LECLERC CREEK

The number of fish caught in each pass and reach measurements can be found in Appendix B, Table B.16. Brown trout density was greatest in reach 1 at 6.0 ± 0.6 fish/100 m^2 (Table 3.18). Brook trout density was highest at reach 3 with 10.2 ± 10.0 fish/l 00 m^2. The greatest density of cutthroat trout was 1.1 ± 0.0 fish/100 m^2 at reach 2. Of the brown trout caught during population estimation, 22.4 percent were 0+, 44.9 percent were 1+, 18.4 percent were 2+, 2.0 percent were 3+, 10.2 percent were 4+, and 2.0 percent were 5+ (Table 3.19). Brook trout were 51.6 percent 0+, 20.0 percent 1+, 25.3 percent 2+, and 3.1 percent 3+. Ten percent of the cutthroat trout were 0+, 70.0 percent 1+, and 20.0 percent 3+. Rainbow trout captured during population estimation were 66.7 percent 2+ and 33.3 percent 3+.

3.2.2.5 RUBY CREEK

The number of fish caught in each pass and reach measurements can be found in Appendix B, Table B.17. The highest density of brook trout was in reach 4 at 34.0 ± 5.7 fish/100 m^2 (Table 3.20). The highest density of cutthroat trout was in reach 3 with ≥0.5 fish/100 m^2. Of the brook trout caught during population estimation, 40.3 percent were 0+, 35.8 were 1+, 18.4 were 2+, and 5.5 were 3+ (Table 3.21). Cutthroat trout were 50 percent 1+ and 50 percent 2+.

3.3 AGE, GROWTH, AND CONDITION

3.3.1 RIVER AND SLOUGHS

3.3.1 .1 LARGEMOUTH BASS

Back-calculated lengths for largemouth bass at the first annulus ranged from 69 to 95 mm with the grand mean at 80 mm (Table 3.22). Mean lengths at the second annulus ranged from 106 to 132 **mm with the grand mean at** 120 **mm. At the end of the third** years growth, mean lengths ranged from 152 to 174 mm with the overall mean at 159 mm. After four years growth, the lengths ranged from 189 to 216 mm with a grand mean of 203 mm. Lengths at the fifth annulus ranged from 218 to 254 mm with a grand mean of 243 mm. After the sixth years growth, mean lengths ranged from 254 to 290 mm with the grand mean at 279 mm. Mean lengths at the

Table **3.18.** Estimated population, **95%** confidence intervals, and fish density for each species of fish captured in **LeClerc** Creek at each reach on September **25, 1989.**

SPECIES	POP. EST.	95% C.I.	#/100m^2±95%C.I.
REACH #1 (91.5 m.)			
Brown trout	37.5	3.7	6.0±0.6
Brook trout	27.8	6.6	4.5±1.1
Rainbow trout	≥1		0.2
REACH #2 (91.5 m.)			
Brown trout	4.0	0	0.7±0
Brook trout	14.3	4.3	2.6±0.8
Rainbow trout	≥1		0.2
Cutthroat trout	6.0	0	1.1±0.0
REACH #3 (91.5 m.)			
Brown trout	9.8	3.3	1.5±0.5
Brook trout	66.1	65.1	10.2±10.0
Cutthroat trout	≥2		≥0.3
REACH #4 (61 m.)			
Brook trout	22.0	2.8	9.0±1.1
Rainbow trout	≥1	0	0.4
Cutthroat trout	≥1	0	0.4

Table **3.19.** Age distribution of trout collected **during** population estimation in **LeClerc** Creek. Age/length relationship was determined **by** back-calculation of the length at **annulus** formation.

BROWN TROUT						
Age	0 +	1 +	2 +	3 +	4 +	5 +
Size range	≤71	72-131	132-224	225-299	300-391	≥392
Number caught	11	22	9	1	5	1
Percent caught	22.4	44.9	1 a.4	2.0	10.2	2.0
BROOK TROUT						
Age	0 +	1 +	2 +	3 +		
Size range	≤87	8-139	140-201	≥202		
Number caught	49	19	24	3		
Percent caught	51.6	20.0	25.3	3.1		
CUTTHROAT TROUT						
Age	0 +	1 +	2 +	3 +		
Size range	≤92	93-136	137-177	≥178		
Number caught	1	7	0	2		
Percent caught	10.0	70.0		20.0		
RAINBOW TROUT						
Age	0 +	1 +	2 +	3 +		
Size range	≤88	a9-120	121-166	≥167		
Number caught	0	0	2	1		
Percent caught			66.7	33.3		

Table **3.20.** Estimated population, **95%** confidence intervals, and fish density for each species of fish captured in Ruby Creek at each reach on September **25, 1989.**

SPECIES	POP. EST.	95% C.I.	#/100m^2±95%C.I.
REACH **#1 (91.5 m)**			
Brook trout	40.0	10.9	8.6±2.4
REACH **#2 (91.5 m.)**			
Brook trout	56.3	21.3	10.9±4.1
Cutthroat trout	1.0	0	0.2±0.0
REACH #3 (91.5 m.)			
Brook trout	123.2	6.1	31.6±1.6
Cutthroat trout	≥2		≥0.5
REACH **#4 (91.5 m.)**			
Brook trout	210.6	13.3	34.0±5.7

Table **3.21.** Age distribution of trout collected during population estimation in Ruby Creek. Age/length relationship was determined by back-calculation of the length at **annulus** formation.

BROOK TROUT				
Age	0+	1+	2+	3+
Size range	≤83	84-129	130-180	≥181
Number caught	162	144	74	22
Percent caught	40.3	35.8	18.4	5.5
CUTTHROAT TROUT				
Age	0+	1+	2+	3+
Size range	≤103	104-157	158-222	≥223
Number caught	0	2	2	0
Percent caught	0	50.0	50.0	0

Table 2.22. Mean back-calculated lengths at the end of each years growth **(annulus** formation) for each year class of largemouth bass.

COHORT	N	MEAN ± S.D. BACK CALCULATED LENGTH AT ANNULUS														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1988	198	69± 9.7														
1987	138	77± 8.6	106± 12.2													
1986	265	83± 9.6	120± 15.4	152 17.7												
1985	55	86± 9.7	124± 12.5	160± 13.3	191± 12.7											
1984	25	91± 8.1	131± 16.0	171± 21.8	210± 28.2	245± 28.8										
1983	28	93± 10.1	132± 12.4	174± 15.2	216± 14.4	254± 16.2	287± 17.3									
1982	38	89± 10.4	131± 15.1	172± 18.1	216± 19.6	252± 17.9	290± 19.0	322± 17.7								
1981	50	89± 7.9	128± 12.1	169± 15.2	207± 17.7	245± 19.8	283± 20.6	321± 21.6	352± 18.0							
1980	32	87± 10.5	123± 12.3	160± 15.2	197± 14.2	235± 16.8	275± 16.9	311± 16.2	347± 14.3	377± 13.0						
1979	10	94± 14.6	131± 14.5	167± 18.7	202± 16.7	238± 17.3	279± 19.0	316± 18.5	354± 17.5	388± 14.7	417± 13.1					
1978	11	87± 10.9	120± 17.1	156± 21.4	190± 23.8	[illegible] 23.1	261± 15.4	300± 10.4	334± 7.9	367± 8.6	397± 10.0	426± 10.2				
1977	8	86± 5.4	119± 8.7	159± 10.1	194± 11.4	231± 12.3	263± 14.8	297± 18.4	328± 21.1	358± 19.4	389± 17.8	417± 17.4	444± 14.6			
1976	4	95± 6.2	131± 6.0	174± 9.6	207± 16.1	238± 19.6	270± 24.9	301± 35.5	334± 36.7	358± 32.5	385± 28.2	421± 30.5	452± 25.5	474± 23.7		
1975	11	86± 6.3	120± 12.8	155± 18.4	189± 20.0	218± 24.0	254± 22.4	284± 22.4	318± 22.2	347± 23.4	375± 21.4	398± 19.4	427± 17.0	458± 11.3	481± 15.2	
1974	3	89± 11.0	121± 10.9	156± 9.4	195± 7.2	229± 8.4	259± 8.9	288± 2.3	316± 3.6	347± 6.9	376± 5.1	407± 6.9	437± 9.4	466± 14.3	489± 17.1	512± 21.8
GRAND MEAN		N=876 80± 12.0	N=678 120± 16.0	N=540 159± 18.8	N=275 203± 20.1	N=220 243± 21.8	N-195 279± 21.1	N=167 313± 22.0	N-129 343± 20.9	N=79 369± 20.0	N=47 392± 22.0	N=37 414± 20.0	N-26 437± 19.0	N=18 463± 15.7	N=14 482± 15.4	N=3 512± 21.8
MEAN ANNUAL GROWTH INCREMENT		80	40	39	44	40	36	34	30	26	23	22	23	26	19	30

seventh annulus ranged from 284 to 322 mm with the grand mean at 313 mm. After eight years of growth, mean lengths ranged from 316 to 354 mm with the overall mean at 343 mm. At the end of nine years of growth the mean lengths ranged from 347 to 388 mm with a grand mean of 369 mm. Lengths at the tenth annulus ranged from 375 to 417 mm with the grand mean at 392 mm. Mean lengths after eleven years of growth ranged from 398 to 426 mm with a grand mean of 414 mm. After twelve years of growth mean lengths ranged from 427 to 452 mm with a grand mean of 437 mm. Mean lengths at the formation of the thirteenth annulus ranged from 458 to 474 mm with the overall mean at 463 mm. The lengths at the fourteenth annulus ranged from 481 to 489 mm with the grand mean at 482 mm. Mean length at the fifteenth annulus was 512 mm.

Mean condition factors ranged from 1.16, for 3+ fish, to 1.83, for 12+ fish (Table 3.23). The mean condition factor for all fish was 1.30.

3.3.1.2 YELLOW PERCH

After the first years growth, mean lengths of yellow perch ranged from 67 to 74 mm with the grand mean at 70 mm (Table 3.24). Mean lengths after the second year of growth ranged from 86 to 98 mm with a grand mean of 92 mm. At the formation of the third annulus, mean lengths ranged from 106 to 120 mm with a grand mean of 114 mm. After the fourth years growth, mean lengths ranged from 130 to 140 mm with the overall mean at 133 mm. Mean lengths after the fifth years growth ranged from 149 to 164 mm with the grand mean at 150 mm. At the formation of the sixth annulus, mean lengths ranged from 165 to 185 mm with the grand mean at 166 mm. After the seventh years growth, mean lengths ranged from 191 to 201 mm with the grand mean at 200 mm. After the eighth year of growth the length was 211 mm.

Mean condition factors ranged from 1.05, for 5+ and 6+, to 1.21, for an 8+ yellow perch (Table 3.25). The grand mean condition factor was 1.08.

3.3.1.3 MOUNTAIN WHITEFISH

Mean lengths after the first years growth ranged from 132 to 148 mm with the grand mean at 138 mm (Table 3.26). After the second year of growth, mean lengths ranged from 195 to 216 mm with the grand mean at 199 mm. At the formation of the third

Table **3.23.** Mean weights, lengths, and condition factors **(K_{TL})** for each age class of **largemouth** bass.

AGE	N	Mean Weight (g) (± S.D.)	Mean Length (mm) (± S.D.)	Mean K_{TL} (± S.D.)
0+	62	3.3±1.5	59.8±10.4	1.39±0.35
1+	179	7.0±3.8	80.8±12.5	1.27±0.28
2+	130	22.5±8.6	120.8±16.2	1.23±0.16
3+	249	57.3±20.8	168.0±18.4	1.16±0.12
4+	47	108.0±27.9	207.1±12.8	1.18±0.10
5+	23	251.4±144.4	263.1±28.7	1.23±0.19
6+	26	413.6±145.7	303.4±20.1	1.40±0.13
7+	35	577.9±115.6	339.3±15.9	1.47±0.16
8+	46	778.4±165.5	367.1±16.6	1.57±0.16
9+	28	1024.9±169.9	398.4±13.1	1.62±0.22
10+	9	1304.4±240.9	433.3±15.6	1.58±0.22
11+	9	1437.9±233.2	438.4±9.3	1.70±0.18
12+	6	1746.3±195.4	455.3±14.4	1.83±0.16
13+	4	2065.3±499.2	487.8±28.7	1.75±0.19
14+	10	2210.2±213.4	494.4±16.4	1.81±0.22
15+	3	2524.7±278.6	522.7±21.1	1.76±0.02
Total	873			1.30±0.26

Table **3.24.** Mean back-calculated lengths at the end of each years growth **(annulus** formation) for each year class of yellow perch.

		MEAN±S.D. SACK CALCULATED LENGTH AT ANNULUS							
COHORT	N	1	2	3	4	5	6	7	8
1988	40	68±7.0							
1987	27	70±7.3	97±12.6						
1986	151	72±6.5	97±8.4	120±11.0					
1985	312	70±6.2	93±7.2	116±8.4	136±9.1				
1984	383	69±6.8	90±7.6	111±9.3	132±8.6	150±8.8			
1983	213	69±7.1	90±7.8	110±8.6	130±9.2	149±9.6	165±9.8		
1982	7	74±7.7	98±10.2	120±19.0	143±20.5	164±19.0	185±17.0	201±17.3	
1981	1	67	86	106	130	152	170	191	211
GRAND MEAN		N=1134 70±6.8	N=1094 92±8.2	N=1067 114±9.9	N=916 133±9.3	N=604 150±9.4	N=221 166±10.6	N=8 200±16.4	N=1 211
MEAN ANNUAL GROWTH INCREMENT		70	22	22	19	17	16	34	11

Table **3.25.** Mean weights, lengths, and condition factors **(K_{TL})** for each age class of yellow perch.

AGE	N	Mean Weight (g) (± S.D.)	Mean Length (mm) (± S.D.)	Mean K_{TL} (± S.D.)
0+	29	3.3±0.8	65.7±7.0	1.06±0.18
1+	33	5.6±2.3	79.0±10.3	1.08±0.18
2+	23	17.2±8.1	112.0±18.8	1.10±0.16
3+	144	27.7±8.1	134.0±11.8	1.12±0.14
4+	300	36.0±9.2	146.9±10.4	1.12±0.14
5+	367	43.7±10.2	160.2±10.0	1.05±0.14
6+	208	55.3±12.1	173.4±9.6	1.05±0.13
7+	5	97.6±19.0	210.6±19.1	1.16±0.10
8+	1	132	222	1.21
Total	1110			1.08±0.14

annulus, mean lengths ranged from 242 to 269 mm with the grand mean at 244 mm. After the fourth years growth, mean lengths ranged from 277 to 321 mm with an overall mean of 279 mm. The mean length after the fifth years growth was 355 mm.

Table 3.27 shows that mean condition factors ranged from 0.69, for 0+ fish, to 0.81, for 5+ mountain whitefish. The condition factor for all mountain whitefish combined was 0.74.

3.3.1.4 BLACK CRAPPIE

Mean lengths at the formation of the first annulus ranged from 53 to 77 mm with the grand mean at 72 mm (Table 3.28). After the second years growth, mean lengths ranged from 87 to 116 mm with a grand mean of 109 mm. Mean lengths after the third years growth ranged from 115 to 148 mm with the overall mean at 142 mm. After four years of growth the mean lengths ranged from 144 to 179 mm with the grand mean at 168 mm. Mean lengths at the formation of the fifth annulus ranged from 168 to 200 mm with the grand mean at 180 mm. After six years of growth, mean lengths ranged from 205 to 214 mm with the grand mean at 207 mm. Mean lengths ranged from 226 to 227 mm with a grand mean of 226 mm after seven years growth. The mean length after the eighth year of growth was 237 mm.

Mean condition factors for black crappie ranged from 1.21, for 1+, to 1.42, for 5+ and 7+ (Table 3.29). The grand mean condition factor was 1.36.

3.3.1.5 BROWN TROUT

Mean lengths after the first years growth ranged from 82 to 122 mm with a grand mean of 101 mm (Table 3.30). At the formation of the second annulus, mean lengths ranged from 128 to 221 mm with the grand mean at 170 mm. After the third year of growth mean lengths ranged from 194 to 303 mm with the grand mean at 240 mm. Mean lengths after the fourth year of growth ranged from 253 to 383 mm with the grand mean at 311 mm. After five years of growth, mean lengths ranged from 305 to 446 mm with the grand mean at 375 mm. Mean lengths ranged from 373 to 443 mm with a grand mean of 423 mm after six years of growth. At the formation of the seventh annulus mean lengths ranged from 431 to 475 mm with the grand mean at 472 mm. After eight years of

Table **3.26.** Mean back-calculated lengths at the end of each years growth **(annulus** formation) for each year class of mountain whitefish.

COHORT	N	MEAN ± S.D. BACK CALCULATED LENGTH AT ANNULUS				
		1	2	3	4	5
1988	68	148±21.3				
1987	136	140±20.3	201±16.4			
1986	308	136±20.9	199±17.6	245±15.0		
1985	140	132±16.6	195±16.7	242±14.8	277±14.4	
1984	7	147±22.8	216±27.1	269±31.3	321±35.6	355±41.6
GRAND MEAN		N=659 138±20.4	N=591 199±17.5	N=455 244±15.6	N=147 279±18.3	N=7 355±41.6
MEAN ANNUAL GROWTH INCREMENT		138	61	45	35	76

Table **3.27.** Mean weights, lengths, and condition factors **(K_{TL})** for each age class of mountain whitefish.

AGE	N	Mean Weight (g) (± S.D.)	Mean Length (mm) (± S.D.)	Mean K_{TL} (± S.D.)
0 +	9	10.9±7.0	115.9±28.8	0.69±0.07
1 +	61	47.2±20.4	183.0±25.6	0.73±0.10
2 +	111	93.1±25.4	230.5±18.5	0.76±0.08
3 +	265	138.4±34.7	265.2±16.3	0.73±0.08
4 +	125	180.8±45.2	292.1±16.0	0.73±0.09
5 +	7	478.4±265.8	376.1±56.7	0.81±0.12
Total	578			0.74±0.09

Table **3.28.** Mean back-calculated lengths at the end of each years growth **(annulus** formation) for each year class of black crappie.

COHORT	N	MEAN±S.D. BACK CALCULATED LENGTH AT ANNULUS							
		1	2	3	4	5	6	7	8
1988	9	66±4.8							
1987	5	70±6.5	112±1.4						
1986	56	79±8.9	116±8.8	148±9.7					
1985	90	77±11.6	109±13.2	142±14.7	171±13.3				
1984	10	53±7.1	87±15.4	115±18.9	144±26.7	168±24.2			
1983	13	55±8.1	90±15.1	129±21.2	159±19.3	183±17.6	205±16.8		
1982	3	65±6.0	113±7.2	137±14.2	168±18.2	196±25.7	212±27.9	227±29.3	
1981	2	59±4.5	98±0.4	138±9.8	179±20.4	200±5.4	214±0.9	226±7.2	237±13.5
GRAND MEAN		N=188 74±12.8	N=179 109±14.5	N=174 142±16.2	N=118 168±17.5	N=28 180±22.3	N=18 207±17.5	N=5 226±21.0	N=2 237±13.5
MEAN ANNUAL GROWTH INCREMENT		74	35	33	26	12	27	19	11

Table **3.29.** Mean weights, lengths, and condition factors **(K_{TL})** for each age class of black crappie.

AGE	N	Mean Weight (g) (± S.D.)	Mean Length (mm) (± S.D.)	Mean K_{TL} (± S.D.)
0+	22	2.2±1.0	54.4±8.[illegible]	1.35±0.19
1+	6	9.7±6.9	86.6±16.5	1.21±0.13
2+	4	23.5±3.5	123.6±4.3	1.29±0.15
3+	55	60.1±13.4	163.3±10.4	1.37±0.13
4+	90	85.6±19.2	183.4±13.6	1.37±0.10
5+	10	82.4±42.3	175.7±24.4	1.42±0.08
6+	12	134.3±27.8	212.6±14.7	1.37±0.14
7+	3	195.3±81.0	236.3±28.4	1.42±0.07
8+	2	186.5±53.0	245.0±9.9	1.25±0.21
Total	204			1.36±0.13

growth mean lengths ranged from 471 to 531 mm with a grand mean of 519 mm. The length after the ninth year of growth was 517 mm.

Table 3.31 shows that brown trout condition factors ranged from 0.86, for 2+, to 1.04, for 8+. The overall condition factor was 0.90.

3.3.1.6 CUTTHROAT TROUT

Back-calculations were made using the proportional method since a good regression could not be obtained for the body length-scale length relationship. After the first years growth, mean lengths ranged from 67 to 114 mm with a grand mean of 87 mm (Table 3.32). At the formation of the second annulus, mean lengths ranged from 124 to 189 mm with the overall mean at 141 mm. After three years of growth, mean lengths ranged from 200 to 232 mm with the grand mean at 222 mm. After the fourth years growth, mean lengths ranged from 248 to 297 mm with a grand mean of 290 mm. The length at the fifth annulus was 324 mm.

Mean condition factors ranged from 0.83, for 4+ fish, to 0.95, for 3+ cutthroat trout (Table 3.33). The grand mean condition factor was 0.90.

3.3.1.7 RAINBOW TROUT

Mean lengths ranged from 85 to 115 mm with a grand mean of 99 mm at the first annulus (Table 3.34). After the second years growth, mean lengths ranged from 126 to 222 mm with the grand mean at 156 mm. At the third annulus, mean lengths ranged from 223 to 354 mm with a grand mean of 252 mm. After four years of growth mean lengths ranged from 360 to 509 mm with a grand mean of 434 mm. The lengths at the fifth and sixth annulus were 641 and 817 mm, respectively.

Mean condition factors for rainbow trout ranged from 0.77, for 0+, to 0.99, for 2+ (Table 3.35). The grand mean condition factor was 0.91.

3.3.1.8 KOKANEE

Mean lengths after the first years growth ranged from 73 to 97 mm with a grand mean of 91 mm (Table 3.36). After two years of growth, mean lengths ranged from 105 to 131 mm with a grand mean of 125 mm. The length at the third annulus was 146 mm.

Table **3.30.** Mean back-calculated lengths at the end of each years growth **(annulus** formation) for each year class of brown trout.

COHORT	N	1	2	3	4	5	6	7	8	9
		MEAN±S.D. BACK CALCULATED LENGTH AT ANNULUS								
1988	20	97±13.7								
1987	19	100±22.5	171±32.4							
1986	35	107±27.2	180±40.9	242±49.1						
1985	6	109±9.1	190±6.4	280±20.5	350±24.6					
1984	7	122±18.6	221±34.6	303±39.1	383±32.9	446±33.5				
1983	16	97±22.7	160±36.5	240±42.8	310±51.0	379±48.0	443±46.4			
1982	13	83±9.5	128±13.8	194±30.7	268±45.5	341±47.1	406±49.4	475±52.8		
1981	4	87±10.7	143±21.9	203±26.2	279±24.7	362±52.3	410±52.1	473±52.7	531±52.1	
1980	1	82	150	202	253	305	373	431	471	517
GRAND MEAN		N=121 101±22.4	N=101 170±39.9	N=82 240±50.4	N=47 311±57.5	N=41 375±57.6	N=34 423±50.0	N=18 472±50.7	N=5 519±52.5	N=1 517
MEAN ANNUAL GROWTH INCREMENT		101	69	70	71	64	48	49	47	-2

Table **3.31.** Mean weights, lengths, and condition factors **(K_{TL})** for each age class of brown trout.

AGE	N	Mean Weight (g) (± S.D.)	Mean Length (nm) (± S.D.)	Mean K_{TL} (± S.D.)
0+	4	8.0±1.4	90.8±7.2	0.97±0.06
1+	18	19.1±7.5	128.8±15.2	0.88±0.12
2+	17	92.7±35.9	218.0±36.2	0.86±0.11
3+	27	193.5±90.5	271.5±52.5	0.87±0.08
4+	4	520.8±112.6	387.8±15.4	0.88±0.11
5+	3	876.7±263.5	479.9±35.8	0.91±0.18
6+	7	1101.6±110.9	484.2±40.9	0.94±0.10
7+	8	1317.5±532.[illegible]	512.9±51.1	1.00±0.13
8+	3	1681.3±486.5	554.5±46.3	1.04±0.10
9+			528	
Total	91			0.90±0.12

Table **3.32.** Mean back-calculated lengths at the end of each years growth **(annulus** formation) for each year class of cutthroat trout. **Back-**calculated lengths were obtained using the proportional met hod.

		MEAN ± S.D. BACK CALCULATED LENGTH AT ANNULUS				
COHORT	N	1	2	3	4	5
1988	2	114±10.6				
1987	1	105	189			
1986	5	83±13.0	137±14.9	213±16.1		
1985	6	82±22.0	140±35.0	232±30.9	297±43.6	
1984	1	67	124	200	248	324
GRAND MEAN		N=15 87±20.0	N=13 141±28.4	N=12 222±25.7	N=7 290±43.8	N=1 324
MEAN ANNUAL GROWTH INCREMENT		87	54	81	68	34

Table **3.33.** Mean weights, lengths, and condition factors **(K_{TL})** for each age class of cutthroat trout.

AGE	N	Mean Weight (g) (± S.D.)	Mean Length (mm) (± S.D.)	Mean K_{TL} (± S.D.)
1 +	2	37.0±15.6	158.3±4.9	0.91±0.30
2 +	1	98	220	0.92
3 +	5	149.0±31.2	250.4±24.2	0.95±0.14
4 +	6	284.8±98.1	323.0±49.7	0.83±0.19
5 +	1	318	334	0.85
Total	15			0.90±0.16

Table **3.34.** Mean back-calculated lengths at the end of each years growth **(annulus** formation) for each year class of rainbow trout.

COHORT	N	MEAN±S.D. BACK CALCULATED LENGTH AT ANNULUS 1	2	3	4	5	6
1988	6	115±19.0					
1987	3	87±32.3	156±48.6				
1986	4	85±12.3	147±26.3	223±30.9			
1985	1	90	126	265	360		
1984	0						
1983	1	97	222	354	509	641	817
GRAND MEAN		N=15 99±22.7	N=9 156±39.4	N=6 252±58.1	N=2 434±104.8	N=1 641	N=1 817
MEAN ANNUAL GROWTH INCREMENT		99	57	96	182	207	176

Table **3.35.** Mean weights, lengths, and condition factors **(K_{TL})** for each age class of rainbow trout.

AGE	N	Mean Weight (g) (± S.D.)	Mean Length (mm) (± S.D.)	Mean K_{TL} (± S.D.)
0 +	1	7	97	0.77
1 +	6	30.7±14.5	145.8±21.4	0.95±0.15
2 +	3	84.3±67.6	196.7±64.3	0.99±0.13
3 +	4	162.3±69.1	266.0±41.2	0.84±0.19
4 +	1	915	470	0.88
6 +			905	
Total	15			0.91±0.15

Mean condition factors for kokanee ranged from 0.71, for 2+, to 1.0, for 3+ (Table 3.37). The overall mean condition factor was 0.80.

3.3.1.9 BULL TROUT

Mean lengths at the first annulus ranged from 78 to 89 mm with a grand mean of 81 mm (Table 3.38). After the second year of growth, mean lengths ranged from 142 to 160 mm with the grand mean at 146 mm. At the third annulus, mean lengths ranged from 232 to 284 mm with a grand mean of 245 mm. Mean lengths after the fourth years growth ranged from 327 to 427 mm with the grand mean of 352 mm. At the fifth annulus, mean lengths ranged from 414 to 551 mm with the grand mean at 448 mm. Mean lengths after six years of growth ranged from 519 to 676 mm with a grand mean of 558 mm. The length after 7 years of growth was 764 mm. The mean condition factor for 6+ bull trout was 0.85 (Table 3.39).

3.3.1.10 LAKE TROUT

Mean length at the first annulus was 98 mm (Table 3.40). The mean length after two years of growth was 166 mm. After three years of growth the mean length was 234 mm. At the fourth annulus, the mean length was 328 mm. After five years of growth the mean length was 414 mm. The mean length at the sixth annulus was 489 mm. The mean condition factor for 6+ lake trout was 0.72 (Table 3.41).

3.3.1.11 NON-TARGET SPECIES

Back-calculated lengths and mean weights, lengths, and condition factors for pumpkinseed, tench, largescale sucker, longnose sucker, northern squawfish, and peamouth can be found in Appendix C.

3.3.2 TRIBUTARIES

3.3.2.1 BROWN TROUT

Mean lengths for Skookum Creek brown trout ranged from 74 to 86 mm with a grand mean of 77 mm at the first annulus (Table 3.42). After the second years growth, mean lengths ranged from 117 to 146 mm with the grand mean at 134 mm. After three years of growth, mean lengths ranged from 159 to 196 mm with a grand mean of 179 mm. At the formation of the fourth annulus the mean lengths ranged

Table **3.36.** Mean back-calculated lengths at the end of each years growth **(annulus** formation) for each year class of **kokanee.**

COHORT	N	MEAN ± S.D. BACK CALCULATED LENGTH AT ANNULUS 1	2	3
1988	8	97±14.3		
1987	3	81±12.0	131±15.3	
1986	1	73	105	146
GRAND MEAN		N=12 91±15.6	N=4 125±18.3	N=1 146
MEAN ANNUAL GROWTH INCREMENT		91	34	21

Table **3.37.** Mean weights, lengths, and condition factors **(K_{TL})** for each age class of **kokanee.**

AGE	N	Mean Weight (g) (± S.D.)	Mean Length (mm) (± SD.)	Mean K_{TL} (± S.D.)
1+	8	13.3±7.0	115.3±24.2	0.80±0.14
2+	3	30.0±8.5	161.7±0.6	0.71±0.19
3+	1	44	164	1.00
Total	12			0.80±0.15

Table **3.38.** Mean back-calculated lengths at the end of each years growth **(annulus** formation) for each year class of bull trout.

COHORT	N	MEAN±S.D. BACK CALCULATED LENGTH AT ANNULUS 1	2	3	4	5	6	7
1983	3	78±10.7	142±20.8	232±26.6	327±45.8	414±27.1	519±18.7	
1982	1	89	160	284	427	551	676	764
GRAND MEAN		N=4 81±10.3	N=4 146±19.3	N=4 245±34.2	N=4 352±62.4	N=4 448±72.1	N=4 558±79.7	N=1 764
MEAN ANNUAL GROWTH INCREMENT		81	65	99	107	96	110	206

Table **3.39.** Mean weights, lengths, and condition factors **(K_{TL})** for each age class of bull trout.

AGE	N	Mean Weight (g) (± S.D.)	Mean Length (mm) (± S.D.)	Mean K_{TL} (± S.D.)
6 +	2	1637.5±519.7	587.3±52.3	0.85±0.02
7 +	1		800	

Table **3.40.** Mean back-calculated lengths at the end of each years growth **(annulus** formation) for each year class of lake trout. Back-calculated lengths were obtained using the proportional method.

		MEAN±S.D. BACK CALCULATED LENGTH AT **ANNULUS**					
COHORT	**N**	1	2	3	4	5	6
1983	3	**98±17.7**	**166±17.0**	**234±23.0**	**328±27.2**	**414±31.4**	**489±30.4**
MEAN ANNUAL **GROWTH** INCREMENT		**98**	**68**	**68**	**94**	**86**	**75**

Table **3.41.** Mean weights, lengths, and condition factors **(K_{TL})** for each age class of lake trout.

AGE	**N**	Mean Weight (g) (± S.D.)	Mean Length (mm) (± S.D.)	Mean K_{TL} (± S.D.)
6+	3	**1049.7±170.5**	**526.3±29.0**	**0.72±0.03**

from 192 to 208 mm with the grand mean at 205 mm. The mean length at the fifth annulus was 219 mm. Mean condition factors for Skookum Creek brown trout ranged from 0.91, for 0+, to 0.98, for 2+ (Table 3.43). The grand mean condition factor was 0.96.

Brown trout cohorts in Cee Cee Ah Creek ranged in mean length from 66 to 77 mm with the grand mean at 68 mm at the first annulus (Table 3.44). After the second year of growth the mean lengths ranged from 116 to 135 mm with the overall mean at 121 mm. At the formation of the third annulus, mean lengths ranged from 165 to 182 mm with the grand mean at 177 mm. The mean length at the fourth annulus was 240 mm. Mean condition factors for brown trout in Cee Cee Ah Creek ranged from 0.94, for 0+ and 1+, to 1 .01, for 3+ and 4+ (Table 3.45). The grand mean condition factor was 0.96.

After the first years growth, LeClerc Creek brown trout ranged in mean length from 67 to 121 mm with a grand mean of 72 mm (Table 3.46). At the second annulus the mean lengths ranged from 123 to 174 mm with the grand mean at 132 mm. Mean lengths at the third annulus ranged from 219 to 268 mm with the grand mean at 225 mm. After the fourth years growth, mean lengths ranged from 268 to 333 mm with a grand mean of 300 mm. The length after the fifth year of growth was 392 mm. Condition factors for LeClerc Creek brown trout ranged from 0.96, for 1+, to 1.09, for 4+ (Table 3.47). The grand mean condition factor was 0.99.

Mean back-calculated lengths at the first annulus ranged from 71 to 85 mm with a grand mean of 78 mm for Ruby Creek brown trout (Table 3.48). After two years of growth, mean lengths ranged from 123 to 130 mm with the grand mean at 125 mm. The mean length at the third annulus was 183 mm. Condition factors ranged from 0.94, for 2+, to 1.25, for 3+, with a grand mean of 1.07 (Table 3.49).

3.3.2.2 BROOK TROUT

Skookum Creek brook trout cohort ranged in mean length at the first annulus from 82 to 90 mm with a grand mean of 89 mm (Table 3.50). At the second annulus mean lengths ranged from 127 to 137 mm with an overall mean of 137 mm. The length at the third annulus was 154 mm. Mean condition factors ranged from 0.95, for 0+, to 1 .01, for 2+, with a grand mean of 0.97 (Table 3.51).

Table **3.42.** Mean back-calculated lengths at the end of each years growth **(annulus** formation) for each year class of brown trout in **Skookum** Creek.

		MEAN ± S.D. BACK CALCULATED LENGTH AT ANNULUS				
COHORT	**N**	**1**	2	3	4	5
1988	**49**	74±15.8				
1987	**41**	79±17.0	137±38.1			
1986	**19**	86±28.4	146±35.0	196±82		
1985	**15**	70±15.2	117±33.3	160±52.2	208±63.5	
1984	3	76±79.0	119±16.9	159±29.0	192±32.2	219±23.3
GRAND MEAN		N=127 77±18.7	N=78 134±36.8	N=37 179±69.3	N=18 205±59.0	N=3 219±23.3
MEAN ANNUAL **GROWTH** INCREMENT		77	57	45	26	14

Table **3.43.** Mean weights, lengths, and condition factors **(K_{TL})** for each age class of brown trout in **Skookum** Creek.

AGE	N	Mean Weight (g) (± S.D.)	Mean Length (mm) (± S.D.)	Mean K_{TL} (± S.D.)
0 +	24	2.5±2.0	62.6±12.1	0.91±0.18
1 +	39	12.2±10.2	99.9±25.2	0.97±0.20
2 +	30	52.9±31.2	160.0±31.8	0.98±0.12
3 +	12	195.9±82.8	225.0±52.7	0.95±0.10
4 +	2	410.5±53.0	253.9±59.0	0.93±0.11
Total	107			0.96±0.16

Table **3.44.** Mean back-calculated lengths at the end of each years growth **(annulus** formation) for each year class of brown trout in **Cee Cee** Ah Creek.

		MEAN ± S.D. BACK CALCULATED LENGTH AT ANNULUS			
COHORT	N	1	2	3	4
1988	81	66±13.2			
1987	51	70±13.5	116±28.9		
1986	32	77±17.6	135±37.4	182±67.3	
1985	4	73±11.4	119±10.4	165±21.9	240±25.9
GRAND MEAN		N=168 68±16.1	N=87 121±34.8	N=36 177±64.7	N=4 240±25.9
MEAN ANNUAL GROWTH INCREMENT		68	53	56	63

Table **3.45.** Mean weights, lengths, and condition factors **(K_{TL})** for each age class of brown trout in **Cee Cee** Ah Creek.

AGE	N	Mean Weight (g) (± S.D.)	Mean Length (mm) (± S.D.)	Mean K_{TL} (± S.D.)
0 +	23	2.2±1.1	62.7±9.3	0.94±0.22
1 +	39	11.8±7.4	91.9±20.4	0.94±0.13
2 +	20	41.9±26.3	139.0±32.0	0.96±0.11
3 +	21	131.0±67.0	200.9±52.2	1.01±0.13
4 +	2	237.0±97.6	270.6±33.5	1.01±0.03
Total				0.96±0.15

Table **3.46.** Mean back-calculated lengths at the end of each years growth **(annulus** formation) for each year class of brown trout in **LeClerc** Creek.

		MEAN ± S.D. BACK CALCULATED LENGTH AT ANNULUS				
COHORT	N	1	2	3	4	5
1988	46	67±17.0				
1987	21	77±15.6	123±27.6			
1986	7	85±9.9	151±16.3	219±25.2		
1985	1	80	157	225	268	
1984	1	121	174	268	333	392
GRAND MEAN		N=76 72±17.7	N=30 132±28.3	N=9 225±25.7	N=2 300±37.8	N=1 392
MEAN ANNUAL GROWTH INCREMENT		72	60	93	75	92

Table **3.47.** Mean weights, lengths, and condition factors **(K_{TL})** for each age class of brown trout in **LeClerc** Creek.

AGE	N	Mean Weight (g) (± S.D.)	Mean Length (mm) (± S.D.)	Mean K_{TL} (± S.D.)
0+	16	2.6±1.7	59.0±12.3	1.00±0.13
1+	28	12.6±9.2	95.2±23.4	0.96±0.16
2+	12	71.8±59.7	162.4±40.5	1.01±0.15
3+	6	261.8±115.2	276.1±48.1	1.07±0.08
4+	1	373	322±4.2	1.09
5+	1	698	410	1.01
Total	64			0.99±0.14

Table **3.48.** Mean back-calculated lengths at the end of each years growth **(annulus** formation) for each year class of brown trout in Ruby Creek.

COHORT	N	MEAN ± S.D. BACK CALCULATED LENGTH AT ANNULUS 1	2	3
1988	4	85±4.0		
1987	6	77±15.1	123±39.2	
1986	2	71±15.7	130±53.4	183±64.5
GRAND MEAN		N=12 78±12.7	N=6 125±38.9	N=2 183±64.5
MEAN ANNUAL GROWTH INCREMENT		78	47	58

Table **3.49.** Mean weights, lengths, and condition factors **(K_{TL})** for each age class of brown trout in Ruby Creek.

AGE	N	Mean Weight (g) (± S.D.)	Mean Length (mm) (± S.D.)	Mean K_{TL} (± S.D.)
0+	3	3.0±1.0	66.3±5.1	1.02±0.27
1+	4	26.5±11.2	132.8±22.9	1.09±0.13
2+	1	75	148.2±27.7	0.94
3+	1	175	199±59.4	1.25
Total	9			1.07±0.18

Table **3.50.** Mean back-calculated lengths at the end of each years growth **(annulus** formation) for each year class of brook trout in **Skookum** Creek.

		MEAN ± S.D. BACK CALCULATED LENGTH AT ANNULUS		
COHORT	N	1	2	3
1988	66	82±16.1		
1987	39	90±15.2	137±21.5	
1986	1	85	127	154
GRAND MEAN		N=106 89±14.9	N=40 137±21.3	N=1 154
MEAN ANNUAL GROWTH INCREMENT		89	48	17

Table **3.51.** Mean weights, lengths, and condition factors **(K_{TL})** for each age class of brook trout in **Skookum** Creek.

AGE	N	Mean Weight (g) (± SD.)	Mean Length (mm) (± S.D.)	Mean K_{TL} (± SD.)
0+	39	2.8±2.2	67.8±15.3	0.95±0.20
1+	47	13.4±8.8	103.8±22.1	0.96±0.16
2+	28	39±20.9	150.5±21.1	1.01±0.19
3+			182	
Total	106			0.97±0.18

Brook trout in Cee Cee Ah Creek ranged in mean length from 86 to 90 mm at the first annulus (Table 3.52). The mean length at the second annulus was 144 mm. Condition factors for brook trout in Cee Cee Ah Creek ranged from 0.96, for 1+ and 2+, to 1.05, for 0+ (Table 3.53). The grand mean condition factor was 0.98.

Tacoma Creek brook trout lengths at the first annulus ranged from 76 to 89 mm with the grand mean at 80 mm (Table 3.54). After the second years growth, the mean length was 129 mm. Mean condition factors ranged from 0.92, for 1+, to 1 .0, for 0+, with a grand mean of 0.97 (Table 3.55).

Brook trout in LeClerc Creek ranged in length from 86 to 91 mm at the first annulus with a grand mean of 88 mm (Table 3.56). After the second year of growth, mean lengths ranged from 139 to 143 mm with the grand mean at 140 mm. The mean length at the third annulus was 202 mm. Mean condition factors for LeClerc Creek brook trout ranged from 0.91, for 0+, to 1 .10, for 3+, with a grand mean of 0.97 (Table 3.57).

Ruby Creek brook trout had mean lengths, at the first annulus, ranging from 82 to 91 mm with a grand mean of 84 mm (Table 3.58). After the second year of growth, mean lengths ranged from 128 to 146 mm with the grand mean at 130 mm. The mean length at the third annulus was 181 mm. Mean condition factors ranged from 0.97, for 1+, to 1.03, for 0+ (Table 3.59). The overall condition factor for Ruby Creek brook trout was 1 .0.

3.3.2.3 CUTTHROAT TROUT

Skookum Creek cutthroat trout had mean lengths, at the first annulus, ranging from 100 to 107 mm with the grand mean at 101 mm (Table 3.60). The length at the second annulus was 136 mm. Mean condition factors ranged from 0.99, for 0+, to 1.03, for 1+, with a grand mean at 1.02 (Table 3.61).

Cutthroat trout in Cee Cee Ah Creek ranged in length from 93 to 97 mm, at the first annulus, with a grand mean of 95 mm (Table 3.62). The mean length at the second annulus was 134 mm. Mean condition factors ranged from 0.84, for 1+, to 0.94, for 2+ (Table 3.63). The overall mean was 0.89.

Table **3.52.** Mean back-calculated lengths at the end of each years growth **(annulus** formation) for each year class of brook trout in **Cee Cee** Ah Creek.

		MEAN ± S.D. BACK CALCULATED LENGTH AT ANNULUS	
COHORT	N	1	2
1988	99	86±16.3	
1987	34	90±14.5	144±19.5
GRAND MEAN		N=133 87±15.9	N=34 144±19.5
MEAN ANNUAL GROWTH INCREMENT		87	57

Table **3.53.** Mean weights, lengths, and condition factors **(K_{TL})** for each age class of brook trout in **Cee Cee** Ah Creek.

AGE	N	Mean Weight (g) (± SD.)	Mean Length (mm) (± S.D.)	Mean K_{TL} (± S.D.)
0+	34	2.5±1.8	59.9±13.8	1.05±0.23
1+	95	14.8±10.0	110.4±23.1	0.95±0.15
2+	45	44.9±19.3	159.9±29.9	0.96±0.09
Total	174			0.98±0.16

Table **3.54.** Mean back-calculated lengths at the end of each years growth **(annulus** formation) for each year class of brook trout in Tacoma Creek.

		MEAN ± S.D. BACK CALCULATED LENGTH AT ANNULUS	
COHORT	N	1	2
1988	33	76±14.1	
1987	11	89±6.2	129±11.6
GRAND MEAN		N=44 80±13.6	N=11 129±11.6
MEAN ANNUAL GROWTH INCREMENT		79	49

Table **3.55.** Mean weights, lengths, and condition factors **(K_{TL})** for each age class of brook trout in Tacoma Creek.

AGE	N	Mean Weight (g) (± S.D.)	Mean Length (mm) (± SD.)	Mean K_{TL} (± S.D.)
0+	38	3.03±1.8	66.3±10.1	1.00±0.21
1+	28	13.4±5.7	113.0±14.3	0.92±0.09
2+	12	38.9±12.8	157.0±15.3	0.98±0.09
Tota	78			0.97±0.16

Table **3.56.** Mean back-calculated lengths at the end of each years growth **(annulus** formation) for each year class of brook trout in **LeClerc** Creek.

		MEAN ± S.D. BACK CALCULATED LENGTH AT ANNULUS		
COHORT	N	1	2	3
1988	42	86±12.9		
1987	36	89±10.7	139±23.6	
1986	8	91±11.6	143±14.9	202±37.9
GRAND MEAN		N=86 88±11.9	N=44 140±22.2	N=8 202±37.9
MEAN ANNUAL GROWTH INCREMENT		88	51	63

Table **3.57.** Mean weights, lengths, and condition factors **(K_{TL})** for each age class of brook trout in **LeClerc** Creek.

AGE	N	Mean Weight (g) (± S.D.)	Mean Length (mm) (± S.D.)	Mean K_{TL} (± S.D.)
0+	27	5.2±2.5	16±13.4	0.91±0.23
1+	37	20±13.3	120±26.2	0.92±0.20
2+	31	69±55.3	173±40.9	1.04±0.12
3+	8	186±94.5	243±45.8	1.10±0.18
Total	103			0.97±0.20

Table **3.58.** Mean back-calculated lengths at the end of each years growth **(annulus** formation) for each year class of brook trout in Ruby Creek.

COHORT	N	MEAN ± S.D. BACK CALCULATED LENGTH AT ANNULUS 1	2	3
1988	98	83±14.3		
1987	70	85±13.1	128±20.7	
1986	6	91±6.6	146±14.6	181±13.4
GRAND MEAN		N=174 84±13.7	N=76 130±20.8	N=6 181±13.4
MEANANNUAL GROWTH INCREMENT		84	47	51

Table **3.59.** Mean weights, lengths, and condition factors **(K_{TL})** for each age class of brook trout in Ruby Creek.

AGE	N	Mean Weight (g) (± S.D.)	Mean Length (mm) (± S.D.)	Mean K_{TL} (± S.D.)
0+	31	3.0±2.1	68.6±15.8	1.03±0.26
1+	57	15.1±8.7	112.0±19.2	0.97±0.16
2+	39	53.5±28.2	162.1±25.9	1.02±0.17
3+	7	80.3±13.9	187±26.2	1.01±0.08
Total	134			1.00±0.19

Table **3.60.** Mean back-calculated lengths at the end of each years growth- **(annulus** formation) for each year class of cutthroat trout in **Skookum** Creek.

		MEAN ± S.D. BACK CALCULATED LENGTH AT **ANNULUS**	
COHORT	**N**	1	2
1988	6	100±27.0	
1987	1	107	**136**
GRAND MEAN		N=7 101±24.8	**N=1** **136**
MEAN ANNUAL **GROWTH** INCREMENT		**101**	**35**

Table **3.61.** Mean weights, lengths, and condition factors **(K_{TL})** for each age class of cutthroat trout in **Skookum** Creek.

AGE	**N**	Mean Weight (g) (± S.D.)	Mean Length (mm) (± SD.)	Mean K_{TL} (± S.D.)
0+	2	3.0±2.8	86.4±24.7	**0.99±0.25**
1+	3	25.7±29.7	121.2±39.6	**1.03±0.26**
2+			**166**	
Total	**5**			1.02±0.22

Table **3.62.** Mean back-calculated lengths at the end of each years growth **(annulus** formation) for each year class of cutthroat trout in **Cee Cee** Ah Creek.

		MEAN ± S.D. BACK CALCULATED LENGTH AT **ANNULUS**	
COHORT	**N**	1	2
1988	7	93±11.4	
1987	3	97±1.5	134±8.9
GRAND MEAN		N=10 95±9.5	N=3 134±8.9
MEAN ANNUAL **GROWTH** INCREMENT		94	40

Table **3.63.** Mean weights, lengths, and condition factors **(K_{TL})** for each age class of cutthroat trout in **Cee Cee** Ah Creek.

AGE	N	Mean Weight (g) (± S.D.)	Mean Length (mm) (± S.D.)	Mean K_{TL} (± S.D.)
0+	3	4.3±1.5	83.3±14.5	0.91±0.16
1+	5	15.4±3.8	124.6±10.2	0.84±0.03
2+	3	32.3±3.8	151.3±10.1	0.94±0.12
Total	11			0.89±0.10

Mean lengths at the first annulus for Tacoma Creek cutthroat trout ranged from 94 to 106 mm with the grand mean at 101 mm (Table 3.64). After the second year of growth, mean lengths ranged from 139 to 153 mm with a grand mean of 140 mm. The length after the third year of growth was 182 mm. Condition factors for Tacoma Creek cutthroat trout ranged from 0.80, for 1+ to 1.05, for 3+, with the grand mean at 0.84 (Table 3.65).

The mean length after the first year of growth, for LeClerc Creek cutthroat trout, ranged from 87 to 98 mm with the grand mean at 93 mm (Table 3.66). After the second year of growth mean lengths ranged from 126 to 142 mm with a grand mean of 137 mm. The mean length at the formation of the third annulus was 178 mm. Mean condition factors ranged from 0.93, for 2+, to 1.06, for 3+ (Table 3.67). The overall condition factor for LeClerc Creek cutthroat trout was 0.93.

Ruby Creek cutthroat trout had mean lengths, after the first annulus, ranging from 95 to 110 mm with a grand mean of 104 mm (Table 3.68). After the second year of growth, mean lengths ranged from 155 to 173 mm with a grand mean of 158 mm. The length after the third year of growth was 223 mm. Mean condition factors ranged from 0.80, for 1+, to 1.12, for 3+, and a grand mean of 0.89 (Table 3.69).

3.3.2.4 RAINBOW TROUT

LeClerc Creek rainbow trout ranged in length, after the first years growth, from 87 to 92 mm with a grand mean of 89 mm (Table 3.70). After the second years growth, mean lengths ranged from 118 to 129 mm with a grand mean of 120 mm. The length at the third annulus was 167 mm. Condition factors ranged from 0.89, for a 3+, to 1.33, for a 1+, with a mean of 1.05 for all rainbow trout (Table 3.71).

Ruby Creek rainbow trout ranged in length, after the first years growth, from 96 to 98 mm with a grand mean of 96 mm (Table 3.72). The mean length after the second year of growth was 147 mm. Mean condition factors were 1 .0 for 1+ and 2+ (Table 3.73).

Table **3.64.** Mean back-calculated lengths at the end of each years growth **(annulus** formation) for each year class of cutthroat trout in Tacoma Creek.

		MEAN ± S.D. BACK CALCULATED LENGTH AT ANNULUS		
COHORT	N	1	2	3
1988	11	94±9.7		
1987	15	106±8.9	139±17.8	
1986	1	105	153	182
GRAND MEAN		N=27 101±10.5	N=16 140±17.5	N=1 182
MEAN ANNUAL GROWTH INCREMENT		101	39	42

Table **3.65.** Mean weights, lengths, and condition factors **(K_{TL})** for each age class of cutthroat trout in Tacoma Creek.

AGE	N	Mean Weight (g) (± S.D.)	Mean Length (mm) (± S.D.)	Mean K_{TL} (± S.D.)
0+	5	5.8±1.3		0.83±0.11
1+	6	16.0±5.1	122.6±13.8	0.80±0.40
2+	14	38.8±12.2	164.8±16.4	0.84±0.09
3+	1	85	201	1.05
Total	26			0.84±0.20

Table **3.66.** Mean back-calculated lengths at the end of each years growth **(annulus** formation) for each year class of cutthroat trout in **LeClerc** Creek.

		MEAN ± S.D. BACK CALCULATED LENGTH AT ANNULUS		
COHORT	N	1	2	3
1988	12	92±8.8		
1987	4	98±13.3	142±23.8	
1986	2	87±34.9	126±43.6	178±38.3
GRAND MEAN		N=18 93±13.0	N=6 137±28	N=2 178±35.3
MEAN ANNUAL GROWTH INCREMENT		93	44	41

Table **3.67.** Mean weights, lengths, and condition factors **(K_{TL})** for each age class of cutthroat trout in **LeClerc** Creek.

AGE	N	Mean Weight (g) (± SD.)	Mean Length (mm) (± S.D.)	Mean K_{TL} (± S.D.)
1+	11	22.7±8.0	128.0±11.3	1.04±0.26
2+	4	56.3±66.4	171.0±51.6	0.93±0.12
3+	2	98	220.0±14.2	1.06
Total	17			0.93±0.36

Table **3.68.** Mean back-calculated lengths at the end of each years growth **(annulus** formation) for each year class of cutthroat trout in Ruby Creek.

		MEAN ± S.D. BACK CALCULATED LENGTH AT ANNULUS		
COHORT	N	1	2	3
1988	4	95±27.8		
1987	5	110±16.8	155±24.9	
1986	1	104	173	223
GRAND MEAN		N=10 104±20.9	N=6 158±23.5	N=1 223
MEAN ANNUAL GROWTH INCREMENT		103	55	65

Table **3.69.** Mean weights, lengths, and condition factors **(K_{TL})** for each age class of cutthroat trout in Ruby Creek.

AGE	N	Mean Weight (g) (± S.D.)	Mean Length (mm) (± S.D.)	Mean K_{TL} (± S.D.)
1+	6	10.2±12.5	96.5±37.5	0.80±0.07
2+	5	47.2±26.7	163.9±29.3	0.97±0.09
3+	1	124	223	1.12
Total	12			0.89±0.13

Table **3.70.** Mean back-calculated lengths at the end of each years growth **(annulus** formation) for each year class of rainbow trout in **LeClerc** Creek.

		MEAN ± S.D. BACK CALCULATED LENGTH AT ANNULUS		
COHORT	N	1	2	3
1988	1	92		
1987	3	87±6.3	118±20.4	
1986	1	91	129	167
GRAND MEAN		N=5 89±4.9	N=4 120±17.6	N=1 167
MEAN ANNUAL GROWTH INCREMENT		89	32	46

Table **3.71.** Mean weights, lengths, and condition factors **(K_{TL})** for each age class of rainbow trout in **LeClerc** Creek.

AGE	N	Mean Weight (g) (± S.D.)	Mean Length (mm) (± S.D.)	Mean K_{TL} (± S.D.)
1+	1	23	120	1.33
2+	1	23	142±10.4	0.93
3+	1	63	192	0.89
Total	3			1.05±0.24

Table **3.72.** Mean back-calculated lengths at the end of each years growth **(annulus** formation) for each year class of rainbow trout in Ruby Creek.

		MEAN ± S.D. BACK CALCULATED LENGTH AT ANNULUS	
COHORT	N	1	2
1988	2	98±5.0	
1987	6	96±6.4	147±10.3
GRAND MEAN		N=8 96±5.8	N=6 147±10.3
MEAN ANNUAL GROWTH INCREMENT		96	51

Table **3.73.** Mean weights, lengths, and condition factors **(K_{TL})** for each age class of rainbow trout in Ruby Creek.

AGE	N	Mean Weight (g) (± S.D.)	Mean Length (mm) (± S.D.)	Mean K_{TL} (± S.D.)
0+	0		74	
1+	2	16.5±5.0	117.5±9.2	1.0±0.07
2+	6	54.3±34.1	170.5±29.7	1.0±0.08
Total	8			1.0±0.07

3.4 FOOD AVAILABILITY IN THE RIVER, SLOUGHS, AND TRIBUTARIES

3.4.1 BENTHIC MACROINVERTEBRATE DENSITIES IN THE RIVER AND SLOUGHS

A total of 198 samples were collected from the Pend Oreille River in 1989. Mean densities of benthic macroinvertebrates in the river ranged from 5,715 organism/m^2, at study site 2, to 24,004 organisms/m^2, at study site 6 (Table 3.74). Chironomidae larvae was the most abundant organism in the benthos of the river making up 23.4 percent of all organisms sampled, with all sites combined (Table 3.75). Talitridae was next at 14.6 percent, followed by Lumbriculidae (12.1%) and Tricorythidae (11 .0%).

A total of 60 samples were collected from sloughs in 1989. Samples were not collected from the sloughs during the month of March due to ice cover. Mean annual densities of benthic macroinvertebrates ranged from 8,387 organisms/m2 at study site 3A to 38,629 organisms/m2 at site 6A (Table 3.76). Chironomidae larvae was generally the most abundant organism in the sloughs (Table 3.77). Lumbriculidae was the next followed by Nematoda, Talitridae, and Tricorythidae.

3.4.2 BENTHIC MACROINVERTEBRATE DENSITIES IN THE TRIBUTARIES AND INVERTEBRATE ABUNDANCE IN THE DRIFT

A total of 96 Hess samples were collected from the tributaries during 1989. LeClerc Creek, Tacoma Creek and one site on Ruby Creek were not sampled during the month of April due to high spring runoff. Mean densities of benthic macroinvertebrates collected in Hess samples ranged from a low of 1,738 organisms/m^2 in Ruby Creek to a high of 4,658 organisms/m2 in Skookum Creek (Table 3.78). The density for Cee Cee Ah Creek was 3,343 organisms/m^2. Tacoma Creek had a density of 3,608 organisms/m2 and LeClerc Creek's density was 4,453 organisms/m?

Chironomidae was the most abundant macroinvertebrate in LeClerc, Cee Cee Ah, and Ruby Creeks, making up 31.4, 30.3, and 18.9 percent of the total number of organisms, respectively (Table 3.79). The most abundant invertebrate in Tacoma Creek was Elmidae, making up 25 percent of the total number. Baetidae was the most

Table 3.74 Mean densities of benthic macroinvertebrates (#/m²) collected from study sites on the Pend Oreille River in 1989. Number of samples enclosed in parenthesis.

STUDY SITE	1	2	3	4	5	6	7	8	9	10	11
MARCH	5535 (3)	5095 (3)	11,510 (3)	13,082 (3)	10,063 (3)	9,057 (3)	11,636 (3)	11,573 (3)	8,742 (3)	6,227 (3)	14,654 (3)
APRIL	15,661 (3)	7,233 (3)	20,635 (3)	10,390 (3)	12,893 (3)	15,850 (3)	7,233 (3)	7,547 (3)	4,767 (3)	5,705 (3)	8,994 (3)
JUNE	5,912 (3)	2,327 (3)	10,881 (3)	18,428 (3)	4,214 (3)	7,170 (3)	9,843 (3)	6,352 (3)	9,749 (3)	7,925 (3)	3,774 (3)
JULY	6,541 (3)	4,340 (3)	5,283 (3)	6,667 (3)	7,170 (3)	10,629 (3)	7,170 (3)	6,604 (3)	6,541 (3)	5,032 (3)	2,704 (3)
SEPTEMBER	6,289 (3)	1,271 (3)	22,327 (3)	23,019 (3)	16,855 (3)	39,812 (3)	27,925 (3)	21,510 (3)	16,667 (3)	71,950 (3)	12,264 (3)
OCTOBER	5,471 (3)	14,025 (3)	30,000 (3)	11,384 (3)	47,736 (3)	61,573 (3)	26,478 (3)	17,422 (3)	12,642 (3)	19,937 (3)	23,900 (3)
ANNUAL MEAN	**7,568 (18)**	**5,715 (18)**	**16,773 (18)**	**13,828 (18)**	**16,489 (18)**	**24,005 (18)**	**14,763 (18)**	**11,835 (18)**	**9,852 (18)**	**19,463 (18)**	**11,049 (18)**

Table 3.75. Mean annual number of benthic macroinvertebrates per square meter at each study site in the Pend Oreille River, WA, in 1989.

	SITE 1	SITE 2	SITE 3	SITE 4	SITE 5	SITE 6	SITE 7	SITE 8	SITE 9	SITE 10	SITE 11	MEAN	%ABUND
TRICHOPTERA													
Leptoceridae	63.0	41.9	104.8	73 4	209.7	230.6	167.7	52.4	188.7	482.3	73.4	153.4	1.1
Hydroptilidae	83 9	283.0	305.1	251.6	115.3	220.1	167.8	199.3	31.5	62 9	41.9	160.2	1.2
Polycentropodidae		31.5	21 0	10 5	10.5	21.0	10 5		10 5		31.5	13.4	0.1
Limnephilidae	10 5											1.0	< 0.1
Rhyacophilidae		1.1										0.1	< 0.1
Phryganeidae					10 5		21.0					2.9	< 0.1
EPHEMEROPTERA													
Tricorythidae	431.9	188 7	1184 5	471 7	492.6	5775 7	1027.3	765.2	1037.7	4675.1	555 6	1509.6	11.0
Baetidae		83.9	157.2	116.3	31 5	272.6	104 8	31 5	42 0	21.0	62 9	84.0	0.6
Leptophlebiidae	10.5											1.0	< 0.1
Ephemeridae	21 0											1.9	< 0.1
Ephemerellidae						10.5				10.5		1.9	< 0.1
Heptageniidae	10.5									10 5		1.9	< 0.1
COLEOPTERA													
Elmidae larvae	167 7	110.1	142.6	453 9	387 9	723 3	576 5	524.1	209.7	855 4	566 1	428.8	3.1
Elmidae adults	52.4	10 5	10 5	11.5	10 5	41.9		10 5	31 5	52.4	31 5	23.9	0.2
Hydrophilidae		10.5										1.0	< 0.1
LEPIDOPTERA													
Pyralidae				1.1								0.1	< 0.1
DIPTERA													
Chironomidae larvae	2020 0	1457.0	4898.3	3721 2	5062 9	4025 2	3859 5	2882 6	1962 3	3071.3	2421 4	3216.5	23.4
Chironomidae pupae	117 4	62 9	136 3	83 9	31 5	136 3	84 9	31 5	62 9	283 0	31 5	96.6	0.7
Ceratopogonidae	191.9	104.8	358 5	262 1	188.7	597 5	557.7	377 4	262 1	209 7	157 2	297.1	2.2
Tipulidae				21 0	21 0	10 5	31 5	62 9	21 0	10 5		16.2	0.1
Simuliidae	10 5	21 0	21.0	10 5	230 6	73 4	283.0	31 5	545 1	115.3		122.0	0.9
Empididae			33 6	41.9	83.9	241 1	167.7	104 8	52 4	10 5	31 5	69.8	0.5
Psychodidae	10.5		31 5									3.8	< 0.1
ODONATA													
Coenagrionidae	84 9	31.5	52.4	41.9	125.8	157.2	146 8	62.9	115.3	608.0	314.5	158.3	1.2
Macromiidae		10 5	10.5		21 0			21 0				5.7	< 0.1
NON INSECTS													
HYDRACARINA	420.4	180.3	670 9	604.8	566.1	1341.7	715 9	765 2	859.6	545.1	587 0	659.7	4.8
AMPHIPODA													
Talitridae	674 0	995.8	2033 6	1577.6	3983.2	3511.6	1593.3	1467.5	704.4	3438.2	2075.5	2005.0	14.6
ANNELIDA													
Lumbriculidae	2050.3	755 8	2227.5	2212.8	2201 3	1949.7	1742.1	1551.4	1283 0	1332.3	1069 2	1670.5	12.1
Hirudinea		1.9	62.9	10 5	41.9	31.5	94.3	62.9	31.5	10.5	21.0	37.2	0.3
PLATYHELMINTHES													
Planariidae	21.0	52.4	178.2	73.4	199.2	314.5	368 0	94.4	199.2	167.7	52.4	156.4	1.1
NEMATODA	115.3	37.7	744.3	1659.3	314.5	471.7	285.1	314.5	356.4	178.2	157.3	421.3	3.1
MOLLUSCA													
Planorbidae	757.9	701.3	1813.4	611.1	660 4	1750.5	1217.0	859.5	870.0	1540.9	1037.8	1074.5	7.8
Lymnaeidae	21.0	84.9	327.1	158.3	146.8	136.4	146.8	31.5	188 7	251.6	115.3	146.2	1.1
Sphaeriidae	210.7	405.7	1205.5	1326.0	1278.8	1813.4	1352.2	1457.0	723.3	1488.5	1582 8	1167.6	8.5
TERRESTRIALS AND OTHERS	11.5	10.5	41.9	22.0	62.9	146 8	41.9	73.4	62.9	31.5	31 5	48.8	0.4
TOTALS	**7568.7**	**5715.2**	**16773.1**	**13828.3**	**16489.0**	**24004.7**	**14763.3**	**11834.9**	**9851.7**	**19462.9**	**11048.8**	**13758.2**	

Table **3.76** Mean densities of **benthic** macroinvertebrates **(#/m²)** collected from sloughs of the **Pend Oreille** River in **1989.** Number of samples enclosed in parenthesis.

STUDY SITE	SITE 3A	SITE 4A	SITE 5A	SITE 6A
APRIL	9,232 (3)	44,151 (3)	66,164 (3)	42,327 (3)
JUNE	4,843 (3)	3,585 (3)	6,038 (3)	5,157 (3)
JULY	3,208 (3)	6,478 (3)	15,157 (3)	17107 (3)
SEPTEMBER	21,069 (3)	34,843 (3)	39,749 (3)	52,956 (3)
OCTOBER	3,579 (3)	24,151 (3)	17,925 (3)	75,598 (3)
ANNUAL MEAN	8,387 (15)	22,642 (15)	29,006 (15)	38,629 (15)

Table **3.77.** Mean annual number and percent composition of macroinvertebrates per square meter in sloughs of the **Pend Oreille** River, WA, in **1989.**

	SITE 3A		SITE 4A		SITE 5A		SITE 6A	
	MEAN	%	MEAN	%	MEAN	%	MEAN	%
TRICHOPTERA								
Leptoceridae	2.5	< 0.1	50.3	0.2	25.2	0.1	163.5	0.4
Hydroptilidae	25.2	0.3	264.2	1.2	490.6	1.7	1257.9	3.3
Limnephilidae	40.3	0.5						
Polycentropodidae	84.3	1.0			12.6	< 0.1	25.2	0.1
Phryganeidae					12.6	< 0.1		
Glossosomatidae							12.6	< 0.1
EPHEMEROPTERA								
Tricorythidae	344.7	4.1	893.1	3.9	289.3	1.0	6830.2	17.7
Baetidae	153.5	1.8	452.8	2.0	25.2	0.1	402.5	1.0
COLEOPTERA								
Elmidae larvae	79.3	0.9	62.9	0.3	62.9	0.2	176.1	0.5
Elmidae adults			37.7	0.2			25.2	0.1
Dytiscidae					12.6	< 0.1		
ODONATA								
Coenagrionidae	50.3	0.6	289.3	1.3	641.5	2.2	553.5	1.4
Corduliidae			25.2	0.1	37.7	0.1		
DIPTERA								
Chironomidae larvae	2501.9	29.8	6213.8	27.4	8012.6	27.6	5572.3	14.4
Chironomidae pupae	80.5	1.0	301.9	1.3	125.8	0.4	3660.4	9.5
Ceratopogonidae	332.1	4.0	742.2	3.3	440.3	1.5	1106.9	2.9
Tipulidae			25.2	0.1			37.7	0.1
Simuliidae					12.6	< 0.1	12.6	< 0.1
Empididae	12.6	0.2	37.7	0.2	25.2	0.1	37.7	0.1
Chaoboridae			25.2	0.1	25.2	0.1		
NON INSECTS								
HYDRACARINA	462.9	5.5	1949.7	8.6	1195.0	4.1	1496.9	3.9
AMPHIPODA								
Talitridae	728.3	8.7	1383.6	6.1	1182.4	4.1	8314.5	21.5
ANNELIDA								
Lumbriculidae	1883.0	22.5	5698.1	25.2	3547.2	12.2	4779.9	12.4
Hirudinea							25.2	0.1
PLATYHELMINTHES								
Planariidae	1.3	< 0.1			37.7	0.1	62.9	0.2
NEMATODA	293.1	3.5	2025.2	8.9	10817.6	37.3	679.3	1.8
MOLLUSCA								
Planorbidae	644.0	7.7	1685.6	7.4	1710.7	5.9	2553.5	6.6
Lymnaeidae	106.9	1.3	289.3	1.3	50.3	0.2	213.8	0.6
Sphaeriidae	496.8	5.9	125.8	0.6	62.9	0.2	515.7	1.3
TERRESTRIALS AND OTHERS	62.9	0.8	62.9	0.3	151.0	0.5	113.2	0.3
TOTAL	8387		22642		29006		38629	

Table **3.78.** Mean densities of **benthic** macroinvertebrates **(#/m²)** collected in Hess samples from the **Pend Oreille** tributaries during **1989.** Sample sizes enclosed in parentheses.

	LECLERC	RUBY	CCA	TACOMA	SKOOKUM
MARCH	5628 (4)	2285 (2)	7425 (4)	3525 (2)	5438 (4)
APRIL	*	2260 (2)	773 (4)	•	6973 (4)
JUNE	4058 (4)	1880 (4)	4778 (4)	2800 (2)	4405 (4)
JULY	7605 (4)	1403 (4)	4408 (4)	1000 (1)	935 (4)
SEPTEMBER	3418 (4)	1868 (4)	1163 (4)	1025 (2)	4268 (4)
OCTOBER	1555 (4)	730 (4)	1513 (2)	9690 (2)	5928 (4)
ANNUAL MEAN	4453 (20)	1738 (20)	3343 (23)	3608 (9)	4658 (24)

• No samples collected

Table 3.79. Mean number and percent composition of macroinvertebrates per square meter (collected by Hess sampler) in tributaries to the Pend Oreille River, WA for the 1989 sampling period.

	LECLERC CREEK		RUBY CREEK		OCA CREEK		TACOMA CREEK		SKOOKUM CREEK	
	MEAN	%	MEAN	%	MEAN	%	MEAN	%	MEAN	%
INSECTA										
TRICHOPTERA (Caddisflies)										
Glossosomatidae	65.0	1.5	54.6	3.1	37.4	1.1	111.0	3.1	98.3	2.1
Brachycentridae	184.5	4.1	32.1	1.8	60.0	1.8	298.0	8.3	110.8	2.4
Hydropsychidae	60.0	1.3	87.1	5.0	32.1	1.0	46.0	1.3	34.2	0.7
Hydroptilidae	2.5	0.1	1.3	0.1	3.8	0.1			4.6	0.1
Limnephilidae	22.0	0.5	4.2	0.2	12.9	0.4	5.0	0.1	6.3	0.1
Rhyacophilidae	102.5	2.3	13.3	0.8	43.9	1.3	48.0	1.3	132.9	2.9
Leptoceridae			1.3	0.1			1.0	< 0.1	0.4	< 0.1
Lepidostomatidae	2.5	0.1								
Psychomyiidae	4.0	0.1	4.6	0.3	2.8	0.1			3.8	0.1
Philopotamidae					0.4	< 0.1				
T. pupae	10.0	0.2			10.0	0.3	6.0	0.2	1.7	< 0.1
EPHEMEROPTERA (Mayflies)										
Heptageniidae	316.5	7.1	95.8	5.5	241.4	7.2	275.0	7.6	590.4	12.7
Ephemerellidae	320.5	7.2	81.3	4.7	83.1	2.5	224.0	6.2	384.2	8.2
Baetidae	1216.0	27.3	209.6	12.1	588.9	17.6	789.0	21.9	692.9	14.9
Leptophlebiidae	5.0	0.1	11.7	0.7	18.5	0.6	17.0	0.5	65.4	1.4
Tricorythidae					3.8	0.1				
PLECOPTERA (Stoneflies)										
Chloroperlidae	119.5	2.7	20.8	1.2	112.1	3.4	45.0	1.2	403.3	8.7
Perlidae	3.0	0.1	12.5	0.7	30.0	0.9	7.0	0.2	4.6	0.1
Nemouridae	15.0	0.3	34.6	2.0	33.8	1.0	88.0	2.4	87.5	1.9
Perlodidae	29.0	0.7	10.8	0.6	39.5	1.2	15.0	0.4	71.7	1.5
Peltoperlidae					131.1	3.9	1.0	< 0.1	2.9	0.1
Capniidae	0.5	< 0.1	87.9	5.1			18.0	0.5	14.6	0.3
Leuctridae					2.1	0.1	4.0	0.1		
Pteronarcyidae									0.4	< 0.1
COLEPTERA (Beetles)										
Elmidae larvae	214.5	4.8	222.9	12.8	393.1	11.8	902.0	25.0	551.7	11.8
Elmidae adults	15	0.3	24.6	1.4	10.6	0.3	61.0	1.7	66.3	1.4
Hydrophilidae					0.4	< 0.1				
Dytiscidae					0.4	< 0.1				
Georyssidae			5.0	0.3	1.3	< 0.1				
ODONATA (Damsel and dragonflies)										
Coenagrioniidae	0.5	< 0.1								
Cordulegastridae			0.8	< 0.1						
LEPIDOPTERA (Moths)										
Pyralidae							25.0	0.7		
DIPTERA (Midges and flies)										
Chironomidae larvae	1399.0	31.4	327.9	18.9	1012.8	30.3	265.0	7.3	569.2	12.2
Chironomidae pupae	27.5	0.6	7.9	0.5	5.4	0.2	4.0	0.1	8.3	0.2
Ceratopogonidae	10.5	0.2	35.8	2.1	7.5	0.2	9.0	0.2	27.1	0.6
Tipulidae	8.0	0.2	20.4	1.2	10.0	0.3	39.0	1.1	74.2	1.6

Table 3.79. (cont.)

	LECLERC CREEK		RUBY CREEK		CCA CREEK		TACOMA CREEK		SKOOKUM CREEK	
	MEAN	%	MEAN	%	MEAN	%	MEAN	%	MEAN	%
Simuliidae	73.5	1.7	65.4	3.8	23.1	0.7	116.0	3.2	63.8	1.4
Tabanidae	2.0	< 0.1								
Empididae	1.5	< 0.1	0.4	< 0.1	4.2	0.1	2.0	0.1	8.8	0.2
Psychodidae	0.5	< 0.1	46.7	2.7	3.2	0.1	41.0	1.1	20.0	0.4
Pelecorhynchidae					0.4	< 0.1				
Dixidae			1.7	0.1						
Sciomyzidae	0.5	< 0.1								
Dolichopodidae	0.5	< 0.1								
Anthericidae					0.6	< 0.1				
NON INSECTS										
HYDRACARINA (Water mites)	12.5	0.3	15.0	0.9	33.3	1.0	60.0	1.7	25.0	0.5
ANNELIDA (Worms)										
Lumbriculidae	65.0	1.5	30.0	1.7	99.6	3.0	46.0	1.3	271.7	5.8
Naididae	97.5	2.2	68.8	4.0	43.8	1.3			5.4	0.1
Hirudinea			0.8	0.0	49.2	1.5				
PLATYHELMINTHES (Flatworms)										
Planariidae	29.0	0.7	6.7	0.4	20.0	0.6	20.0	0.6	71.3	1.5
NEMATODA	4.0	0.1	0.8	< 0.1	20.8	0.6	3.0	0.1	57.9	1.2
MOLLUSCA (Snails and clams)										
Planorbidae	2.5	0.1	1.7	0.1	0.8	< 0.1			13.8	0.3
Lymnaeidae					0.4	< 0.1				
Sphaeriidae	0.5	< 0.1	77.9	4.5	104.2	3.1	6.0	0.2	101.7	2.2
TERRESTRIALS AND OTHERS										
COLLEMBOLA (Springtails)	2.0	< 0.1	0.4	< 0.1	0.8	< 0.1	1.0	< 0.1	0.8	< 0.1
TRICHOPTERA (Caddisflies)					1.3	< 0.1			3.3	0.1
DIPTERA (Midges and flies)										
Chironomidae			0.8	< 0.1			1.0	< 0.1		
Ceratopogonidae	1.5	< 0.1								
Simuliidae			0.8	< 0.1					1.3	< 0.1
Empididae			0.4	< 0.1						
Mycetophilidae			0.4	< 0.1			1.0	< 0.1		
EPHEMEROPTERA (Mayflies)										
Ephemerellidae					0.4	< 0.1				
PLECOPTERA (Stoneflies)										
Chloroperlidae									0.4	< 0.1
HOMOPTERA (Leaf bugs)										
Aphididae	2.5	0.1	0.8	< 0.1	2.1	0.1	3.0	0.1	1.7	< 0.1
Coccidae			0.4	< 0.1						
Cicadellidae	0.5	< 0.1	3.3	0.2	0.6	< 0.1	1.0	< 0.1	1.3	< 0.1
HYMENOPTERA (Bees and ants)										
Formicidae			2.1	0.1	0.4	< 0.1			0.4	< 0.1
Eurytomidae			0.8	< 0.1						
Ichneumonidae			0.4	0.0						
Braconidae			0.4	0.0						
THYSANOPTERA (Thrips)										
Thripidae	2.5	0.1			1.7	0.1	3.0	0.1	0.8	< 0.1
ARACHNIDS (Spiders)	1.0	< 0.1	1.7	0.1	1.7	0.1			0.4	< 0.1
OTHERS					2.1	0.1	1.0	< 0.1	0.4	< 0.1
TOTAL	**4453**		**1738**		**3343**		**3608**		**4658**	

abundant invertebrate in Skookum Creek at 14.9 percent, as well as the second most abundant invertebrate in LeClerc (27.3%), Tacoma Creek (21.9%) and Cee Cee Ah Creek (17.6%). Other macroinvertebrates commonly found in all the tributaries were Heptageniidae, Ephemerellidae, Brachycentridae and Rhyacophilidae.

One-hundred drift samples were collected from the tributaries during 1989. Mean densities of invertebrates found in drift samples ranged from 97 organisms/100 m^3 in Skookum Creek to 420 organisms/100m^3 in Ruby Creek (Table 3.80). Densities for Cee Cee Ah Creek, LeClerc Creek, and Tacoma Creek were 103, 126, and 158 organisms/l 00 m^3, respectively.

Baetidae was the most common family of invertebrates found in the drift in LeClerc Creek (23.7%) and Skookum Creek (25.4%) (Table 3.81). Chironomidae larvae was the most abundant organism found in Cee Cee Ah Creek (16.2%) and Tacoma Creek (18.6%) and the second most abundant organism in LeClerc Creek (15.7%) and Skookum Creek (15.1%). In Ruby Creek, the drift was composed of 29 percent Nemouridae, followed by Baetidae (23%). Other common benthic macroinvertebrates found in the drift were Heptageniidae, Ephemerellidae, Elmidae, Simuliidae and Brachycentridae.

Percent abundance of terrestrial insects found in the drift ranged from 2 percent in Ruby Creek to 13 percent in Cee Cee Ah Creek. The most common terrestrial invertebrates found in the drift were Aphididae, Collembola, Arachnida, and Baetidae adults.

3.4.3 ZOOPLANKTON

3.4.3.1 DENSITY

The monthly mid-river zooplankton data is the mean of 11 zooplankton tows, one at each of the river study sites, except in April when all but three river samples were lost. The monthly littoral zooplankton data is the mean of 11 littoral and 4 slough samples except: in March when site 3 was missed and two sloughs (4A and 5A) were inaccessible due to ice; in April when all but three littoral samples were lost; and in June when site 4A was missed.

Total zooplankton densities, in the mid-river samples ranged from 10.5 organisms/liter, in March, to 385.6 organisms/liter, in June, with an annual mean of 95.29 organisms/liter (Table 3.82). Total cladoceran densities ranged from 0.7 organisms/liter, in

Table **3.80.** Mean densities of macroinvertebrates **(#/100m³)** collected in drift samples from **Pend Oreille** tributaries during **1989.** Sample sizes enclosed in parentheses.

	LECLERC	RUBY	CCA	TACOMA	SKOOKUM
MARCH	102 (4)	1587 (2)	56 (4)	557 (2)	109 (4)
APRIL	*	183 (4)	400 (4)	*	79 (4)
JUNE	211 (4)	112 (4)	26 (4)	84 (2)	184 (4)
JULY	84 (4)	445 (4)	31 (4)	32 (2)	17 (4)
SEPTEMBER	190 (4)	167 (4)	33 (4)	96 (2)	84 (4)
OCTOBER	41 (4)	39 (4)	73 (4)	21 (2)	108 (4)
ANNUAL MEAN	126 (20)	420 (22)	103 (24)	158 (10)	97 (24)

* No samples collected

Table 3.81. Mean number and percent composition of macroinvertebrates per 100 cubic meters (collected by drift sampler) in tributaries to the Pend Oreille River, WA, for the 1989 sampling period.

	LECLERC CREEK		RUBY CREEK		CCA CREEK		TACOMA CREEK		SKOOKUM CREEK	
	MEAN	%	MEAN	%	MEAN	%	MEAN	%	MEAN	%
INSECTA										
TRICHOPTERA (Caddisflies)										
Glossosomatidae	0.6	0.5	0.7	0.2	0.4	0.3	0.1	< 0.1	0.4	0.4
Brachycentridae	4.8	3.9	11.9	2.8	0.7	0.6	28.8	18.2	3.7	3.8
Hydropsychidae	0.1	0.1	5.7	1.3	0.1	0.1	0.1	< 0.1	0.3	0.3
Hydroptilidae					0.2	0.2				
Limnephilidae			15.5	3.7	0.3	0.3			0.5	0.5
Rhyacophilidae	1.1	0.9	4.9	1.2	0.9	0.8	0.2	0.2	1.2	1.2
Polycentropodidae	0.1	< 0.1								
Lepidostomatidae			0.2	0.1						
Philopotamidae					0.1	0.1				
EPHEMEROPTERA (Mayflies)										
Heptageniidae	1.2	1.0	15.1	3.6	3.7	3.6	8.7	5.5	6.8	7.0
Ephemerellidae	5.4	4.3	11.3	2.7	1.0	1.0	17.1	10.8	3.7	3.8
Baetidae	29.7	23.7	96.9	23.0	9.6	9.3	14.8	9.4	24.6	25.4
Leptophlebiidae	0.2	0.2	4.1	1.0	0.5	0.5	0.1	0.1	0.9	0.9
Tricorythidae									0.1	0.1
PLECOPTERA (Stoneflies)										
Chloroperlidae	2.4	1.9	1.7	0.4	0.3	0.3			1.6	1.7
Perlidae	0.1	0.1	0.2	0.1						
Nemouridae	1.0	0.8	121.9	29.0	1.1	1.0	0.4	0.2	1.2	1.2
Perlodidae	0.3	0.2	1.8	0.4	0.1	0.1	8.3	5.3	0.6	0.6
Peltoperlidae					0.1	0.1				
Capniidae			0.1	< 0.1						
COLEPTERA (Beetles)										
Elmidae larvae	8.9	7.1	18.8	4.5	6.1	5.9	7.6	4.8	5.0	5.2
Elmidae adults	2.7	2.1	6.1	1.4	0.5	0.5	1.9	1.2	1.2	1.2
Staphylinidae			0.4	0.1						
Hydrophilidae					0.5	0.5			0.1	0.1
Dytiscidae	0.2	0.2	0.2	< 0.1			0.1	< 0.1	0.3	0.3
Georyssidae	0.6	0.5	0.2	< 0.1	0.2	0.2	4.7	3.0	0.1	0.1
ODONATA (Damsel and dragonflies)										
Coenagrionidae					0.5	0.5				
LEPIDOPTERA (Moths)										
Pyralidae							0.1	0.1		
DIPTERA (Midges and flies)										
Chironomidae larvae	19.7	15.7	24.0	5.7	16.7	16.2	29.4	18.6	14.6	15.1
Chironomidae pupae	17.0	13.5	3.5	0.8	4.1	4.0	1.2	0.8	10.9	11.3
Ceratopogonidae	0.1	< 0.1	0.9	0.2	1.5	1.4			0.1	0.1
Tipulidae	0.6	0.5	2.6	0.6	1.4	1.4			0.6	0.7
Simuliidae	9.6	7.6	38.5	9.2	3.2	3.1	2.4	1.5	2.9	3.0
Psychodidae	0.1	0.1	3.7	0.9	1.6	1.6	9.1	5.7	1.0	1.0
Stratiomyidae	0.1	0.1			1.2	1.1				
Mycetophilidae	0.1	0.1								
Dixidae	0.1	0.1			0.1	0.1	0.1	0.1		
Muscidae									0.2	0.2
NONINSECTS										
HYDRACARINA (Water mites)	2.5	2.0	6.2	1.5	4.3	4.2	4.5	2.8	2.4	2.5
ANNELIDA (Worms)										
Lumbriculidae	0.7	0.5	5.4	1.3	1.2	1.1	4.1	2.6	1.0	1.0
Naididae			2.7	0.7	4.0	3.8				
Hirudinea	0.2	0.2								

Table **3.81** (cont.)

	LECLERC CREEK		RUBY CREEK		CCA CREEK		TACOMA CREEK		SKOOKUM CREEK	
	MEAN	%	MEAN	%	MEAN	%	MEAN	%	MEAN	%
PLATYHELMINTHES (Flatworms)										
Planariidae			2.4	0.6	0.7	0.6				
NEMATODA										
MOLLUSCA (Snails and clams			0.4	0.1	11.2	10.9				
Planorbidae										
Lymnaeidae	0.1	< 0.1	0.2	< 0.1	1.9	1.8				
Sphaeriidae										
TERRESTRIALS AND OTHERS	0.1	< 0.1	4 5	1.1	10 6	10.3	0.5	0.3	3 5	3.6
COLLEMBOLA (Springtails)	0.3	0.3	2.3	0.5	4.7	4.5			2 9	3.0
TRICHOPTERA (Caddisflies)	0.7	0 6							0.1	0.1
DIPTERA (Midges and flies)										
Chironomidae	0.6	0 5	0.8	0.2	0.3	0.3	0.1	0 1	0 1	0.1
Simuliidae	1.5	1.2	6.3	0 1	0.1	< 0.1	1.5	0.9	0.3	0.3
Empididae	0.9	0.7	0.2	< 0.1	0 1	0.1	0.8	0 5		
Mycetophilidae	0.8	0.6								
Tipulidae			0 1	< 0.1						
Sciaridae										
Phoridae	0.1	< 0.1	0.2	< 0.1	0.1	< 0.1				
					0.1	< 0.1				
Asilidae									0 1	0.1
Bibionidae									0.1	0.1
Chamaemyiidae							0.1	< 0.1		
PLECOPTERA (Stoneflies)			0.2	< 0.1						
EPHEMEROPTERA (Mayflies)										
Baetidae	3.2	2.5	0.7	0.2			1.4	0.9	0 4	0 4
Heptageniidae							0.1	< 0.1		
COLEOPTERA (Beetles)										
Staphylinidae	0.1	0.1	0.1	< 0.1					0.3	0.3
Curculionidae	0.1	< 0.1								
Hydrophilidae	0.1	< 0.1								
Dytiscidae	0 1	0.1								
Chrysomelidae	0.1	< 0.1								
Dermestidae	0.1	< 0.1								
Carabidae										
Crytophagidae							0.1	< 0.1		
Salpingidae	0.2	0.2								
HEMIPTERA (True bugs)									0 1	0.1
Lygaeidae	0.1	< 0.1								
HOMOPTERA (Leaf bugs)										
Aphididae	3.2	2.5	1.0	0.2	1.5	1.5	6.6	4 2	2 1	2 2
Cicadellidae	0.2	0.2	0 2	0.1			0.1	0.1	0 1	0 1
HYMENOPTERA (Bees and ants)										
Formicidae	8.7	8.5	0.4	0.1	0.1	0.1	1.4	0.9	0.3	0 3
Eurytomidae	0.1	0 1								
Cimbicidae					0.1	0.1				
Ichneumonidae	0.1	0.1	0.1	< 0.1						
Mymaridae										
Pteromalidae			0.2	< 0.1						
Braconidae	0.1	0.1			0.1	0.1				
PSOCOPTERA (Barklice)					0.1	0 1	0.8	0.5		
Psocidae	0.5	0.4			0.1	0.1	0.5	0.3	0 1	0 1
THYSANOPTERA (Thrips)										
Thripidae					0.1	0.1			0 3	0 3
NEUROPTERA (Lacewings)										
Chrysopidae	0.1	0.1	0.1	< 0.1						
CHILOPODA (Centipedes)					0.3	0.3				
DIPLOPODA (Millipedes)					0 2	0 2				
ARACHNIDS (Spiders)	0.4	0.3	0.4	0 1	4.4	4.3	0.1	0.1	0 1	0.1
OTHERS	0.7	0 5	0 6	0 1	0 6	0.6	0.1	0 1		
TOTAL	1 2 6		4 2 0		1 0 3		1 5 8		9 7	

Table **3.82.** Densities of major groups of **zooplankton** found in mid-river samples collected from the **Pend Oreille** River, **1989.**

	March	April	June	July	September	October	Mean	% Abund
Cladocera								
Daphnidae	0.00	0.02	0.65	2.20	1.04	0.40	0.72	0.75
Chydoridae	0.46	0.41	0.29	0.06	0.53	0.24	0.33	0.35
Bosminidae	0.23	1.67	9.16	5.05	1.96	2.26	3.39	3.56
Macrothicidae	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Sididae	0.00	0.00	0.08	0.49	0.17	0.03	0.13	0.13
Leptadoridae	0.00	0.00	0.00	0.03	0.00	0.00	0.01	0.01
Total **Cladocera**	0.69	2.12	10.18	7.83	3.70	2.93	4.58	4.80
Copepoda								
Cyclopoida	1.45	4.68	6.95	14.29	1.11	2.99	5.25	5.50
Calanoida	2.05	3.92	0.79	3.52	1.15	0.79	2.04	2.14
Harpacticoida	0.04	2.56	0.05	0.01	0.01	0.00	0.45	0.47
Nauplii	4.07	13.48	14.60	7.82	3.20	2.77	7.66	8.04
Total Copepoda	7.61	24.64	22.39	25.64	5.47	6.55	15.38	16.14
Total **Rotifera**	2.24	11.43	353.07	31.34	24.57	29.35	75.33	79.06
Total Zooplankton	10.54	38.19	385.64	64.81	33.74	38.83	95.29	

March, to 10.2 organisms/liter, in June, with an annual mean of 4.6 organisms/liter. Bosminidae was the major family of cladocerans in all months except in March when Chydoridae was more abundant. Total copepod densities ranged from 5.5 organisms/liter, in September, to 25.6 organisms/liter, in July, with an annual mean of 15.4 organisms/liter. Nauplii were the major component of the total copepod density for all but July and October when cyclopoids were the most abundant. Rotifers made up 79.1 percent of the mean annual zooplankton density in the mid-river; with copepods making up 16.1 percent and cladocerans 4.8 percent.

Mean zooplankton densities were generally lowest at site 5 with a mean density of 67.6 organisms/liter (Table 3.83). Site 2 had the highest mean density at 188.7 organisms/liter. The monthly densities, for each species of zooplankton at each site, in the mid-river samples can be found in Appendix E, Tables E.1 through E.6.

Total zooplankton densities in the littoral samples ranged from 25.9 organisms/liter, in March, to 302.3 organisms/liter, in June, with an annual mean of 120.5 organisms/liter (Table 3.84). Total cladoceran densities ranged from 1 .0 organisms/liter, in March, to 56.8 organisms/liter, in July, with an annual mean of 20.3 organisms/liter. Chydoridae was the most abundant family of cladocerans in March, September, and October, Bosminidae was the most abundant in April and June, and Daphnidae was the most abundant in July. Total copepod densities ranged from 14.8 organisms/liter, in March, to 38.6 organisms/liter, in July, with an annual mean of 27.2 organisms/liter. Nauplii were the most abundant instar of copepod for all months except July and October, when the cyclopoid order was the most abundant. Rotifers accounted for 60.5 percent of the total zooplankton abundance in the littoral samples while copepods and cladocerans accounted for 22.6 and 16.9 percent, respectively.

Mean zooplankton densities were lowest at site 6 with 53.0 organisms/liter and highest at site 5A with 369.5 organisms/liter (Table 3.85). The monthly densities for each species of zooplankton collected in the littoral samples, at each site, can be found in Appendix E, Tables E.7 through E.12.

3.4.3.2 BIOMASS

Cladoceran biomass, in the mid-river samples, ranged from 0.82 μg/l, in March, to 22.6 μg/l, in July (Table 3.86). The mean

Table **3.83.** Mean densities (organisms/liter) of **zooplankton** samples from the **mid-**channel of the **Pend Oreille** River, **1989,** by sample site and by month.

	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10	Site 11
March	10.0	8.3	9.9	10.9	10.8	7.0	14.6	11.0	10.5	8.9	7.7
June	436.0	762.4	364.4	308.9	235.1	450.4	313.6	368.1	293.7	306.8	402.6
July	47.2	50.0	56.4	-6.0	51.2	50.7	78.6	70.3	82.0	70.6	99.9
September	18.8	81.1	19.9	24.9	24.1	28.9	44.3	37.6	34.1	23.5	33.9
October	168.6	41.8	22.3	21.6	16.8	22.2	24.2	31.5	24.5	27.7	26.0
Site mean	137.4	188.7	94.6	84.5	67.6	111.8	95.1	103.7	88.9	87.5	114.0

Table **3.84.** Densities of major groups of **zooplankton** found in littoral samples collected from the **Pend Oreille** River, **1989.**

	March	April	June	July	September	October	Mean	% Abund
Cladocera								
Daphnidae	0.91	1.03	2.90	35.21	4.81	1.30	7.37	6.12
Chydoridae			4.54	1.26	17.70	9.21	5.78	4.79
Bosminidae	0.12	1.06	15.24	18.59	2.73	1.91	6.61	5.49
Macrothicidae	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sididae	0.00	0.00	1.09	1.68	0.72	0.00	0.58	0.48
Leptadoridae	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00
Total **Cladocera**	1.03	2.09	23.77	56.76	25.96	12.42	20.34	16.88
Copepoda								
Cyclopoida	[illegible]	10.06	11.49	19.63	7.03	13.23	10.40	8.63
Calanoida	2.07	11.48	1.16	2.50	0.55	1.50	3.21	2.66
Harpacticoida	0.99	1.90	0.63	0.27	0.08	0.69	0.76	0.63
Nauplii	10.82	13.81	18.30	16.24	13.66	4.16	12.83	10.65
Total **Copepoda**	14.84	37.25	31.58	38.64	21.32	19.58	27.20	22.58
Total **Rotifera**	10.07	3.67	246.92	95.64	37.05	44.29	72.94	60.54
Total **Zooplankton**	25.94	43.01	302.27	191.04	84.33	76.29	120.48	

Table **3.85.** Mean densities (organisms/liter) of **zooplankton** samples from the littoral areas of the **Pend Oreille** River, **1989,** by sample site and by month.

	Site 1	Site 2	Site 3	Site 3A	Site 4	Site 4A	Site 5	Site 5A	Site 6	Site 6A	Site 7	Site 8	Site 9	Site 10	Site 11
March	11.2	57.2		3.5	104.3		5.4		13.1	32.6	4.5	11.1	5.6	46.5	16.5
June	519.5	284.3	746.7	34.0	19.9		51.7	570.7	85.4	233.6	722.7	47.2	347.2	420.5	106.0
July	519.6	131.5	84.2	115.3	224.4	113.1	179.4	781.3	56.5	56.3	53.0	151.0	116.3	96.4	187.2
September	0.2	70.4	229.7	204.5	69.3	147.7	14.0	111.2	50.3	36.8	101.5	58.1	110.8	36.0	24.3
October	402.8	78.2	12.9	288.4	45.2	46.2	24.9	14.7	59.7	30.8	39.9	26.7	20.0	15.8	38.5
Site mean	290.6	124.3	268.4	129.1	92.6	102.3	55.1	369.5	53.0	78.0	184.3	58.8	120.0	123.0	74.5

Table **3.86.** Biomass for selected **cladocerans** found in mid-river samples collected from the **Pend Oreille** River, **1989.**

	March	April	June	July	September	October	Mean
Ceriodaphnia quadrangula			0.30	0.10	0.20	0.02	0.10
Ceriodaphnia reticulata			0.82	0.02	0.04		0.15
Daphnia ambigua				0.07	0.30	0.41	0.13
Daphnia galeata mendotae			0.31	2.22	1.92	1.30	0.96
Daphnia parvula			0.17	0.09			0.04
Daphnia pulicaria			0.09	0.37	0.07		0.09
Daphnia retrocurva				3.71	0.31		0.67
Daphnia schodleri					0.06		0.01
Daphnia thorata		0.29	0.14	6.23	4.48	0.20	1.89
Megafenestra aurita			0.14				0.02
Chydorus sphaericus	0.54	0.50	0.24	0.06	0.30	0.20	0.31
Bosmina longirostris	0.28	2.02	11.08	5.86	2.49	3.61	4.22
Diaphanosoma birgei				1.10	0.53	0.13	0.29
Diaphanosoma brachyurum			0.15		0.01	0.04	0.03
Sida crystallina			0.21	2.21	0.86		0.55
Leptodora kindti				0.61			0.10
Total	0.82	2.81	13.65	22.65	11.57	5.91	9.57

Table **3.87.** Biomass for selected **cladocerans** found in littoral samples collected from the **Pend Oreille** River, **1989.**

	March	April	June	July	September	October	Mean
Ceriodaphnia quadrangula			1.61	45.84	5.01	0.11	8.76
Ceriodaphnia reticulata			0.37	0.32	0.36	0.04	0.18
Daphnia ambigua							0.00
Daphnia galeata mendotae			0.99	2.39	2.19	0.89	1.08
Daphnia parvula				0.04			0.01
Daphnia pulicaria					0.14		0.02
Daphnia retrocurva				1.33	0.36		0.28
Daphnia schodleri							0.00
Daphnia thorata				19.72	4.27		4.00
Megafenestra aurita			0.26	0.09			0.06
Chydorus sphaericus	1.05	1.24	4.36	0.79	5.18	3.42	2.67
Bosmina longirostris	0.15	1.28	18.44	2-1-i-6	3.47	3.06	7.99
Diaphanosoma birgei			1.40	1.70	2.58		0.95
Diaphanosoma brachyurum			0.02		0.33		0.06
Sida crystallina			6.95	16.04	0.49		3.91
Leptodora kindti			0.06	0.41			0.08
Total	1.20	2.52	34.46	110.23	24.38	7.52	30.05

biomass for all months was 9.57 μg/l. *Bosmina longirostris* had the highest biomass at 4.22 μg/l followed by *Daphnia thorata* (1.89 μg/l), *Daphnia galeata mendotae* (0.96 μg/l), *Daphnia retrocurva* (0.67 μg/l), and *Sida crystallina* (0.55 μg/l).

Cladoceran biomass, in the littoral samples, ranged from 1.2 μg/l, in March, to 110.23 μg/l, in July (Table 3.87). The mean biomass for all months was 30.05 μg/l. *Ceriodaphnia quadrangula* had the highest biomass at 8.76 μg/l followed by *Bosmina longirostris* (7.99 μg/l), *Daphnia thorata* (4.0 μg/l), *Sida crystallina* (3.91 μg/l), *Chydorus sphaericus* (2.67 μg/l), and *Daphnia galeata mendo tae* (1.08 μg/l).

3.5 RIVER AND SLOUGH FISH FEEDING HABITS

Results of river and slough fish stomach analysis were based on mean annual values. The index of relative importance of each prey item for each age class of each species were listed. Electivity indices for zooplankton and benthic macroinvertebrates were calculated using numerical frequency values. Diet overlaps were computed using IRI values. Results of number percentages, weight percentages, occurrence frequency, and seasonal feeding habits in the river and sloughs are listed in Appendix F. Seasonal feeding habit data includes: mean number (± standard deviation) and mean weight, number percentage, weight percentage, occurrence frequency and index of relative importance for each prey item consumed by each species of fish.

3.5.1 YELLOW PERCH FEEDING HABITS

In 1989, 609 yellow perch stomachs were analyzed, and 40 families of invertebrates were identified in their stomachs. Table 3.88 lists mean annual index of relative importance. Daphnidae had the highest IRI value (19.6%) for 0+ yellow perch. Coenagriidae had the highest IRI value at 17.0 percent for 1+ yellow perch. For 2+ yellow perch, Chironomidae larvae had an IRI value of 31 .0 percent followed by Ostracoda at 15.5 percent. Baetidae had an IRI value of 30.7 percent for 3+ yellow perch and 15.2 percent for 4+ yellow perch. For 5+ yellow perch, Chironomidae larvae had an IRI value of 11 .6 percent followed by Chironomidae pupae (11.3%) and Baetidae (11.1%). Baetidae (15.1%) had the highest IRI value for 6+ yellow perch. Lumbriculidae had the highest IRI value for 7+ yellow perch at 24.2 percent. The IRI's for all ages of yellow perch indicate that

Table **3.88.** Mean annual index of relative importance of prey items consumed by yellow perch for **1989, Pend Oreille** River, WA.

AGE CLASS	0+	1+	2+	3+	4+	5+	6+	7+	All ages
SAMPLE SIZE	19	25	11	62	164	187	139	2	609
TRICHOPTERA (Caddisflies)									
Hydroptilidae	0.7	0.6	4.9	3.9	2.6	2.9	3.8		2.4
Limnephilidae				0.5	0.6	1.5	1.1	16.1	2.4
Leptoceridae		3.4	1.8	1.6	1.3	1.7	1.5		1.4
Phryganeidae				0.3		0.6	0.6		0.2
Hydropsychidae							0.3		< 0.1
Brachycentridae					0.1				< 0.1
Psychomyiidae						0.1			< 0.1
EPHEMEROPTERA (Mayflies)									
Baetidae	15.9	11.5	5.8	30.7	15.2	9.9	15.1	9.6	14.2
Leptophlibidae							0.1		< 0.1
Ephemerellidae						0.1			< 0.1
Tricorythidae				0.8	0.6	0.7			0.3
PLECOPTERA (Stoneflies)									
Nemouridae						< 0.1			< 0.1
ODONATA (Damsel and dragonflies)									
Coenagriidae	16.7	17.0	6.8	2.1	5.6	3.5	5.4		7.1
Libellulidae						0.1			< 0.1
Aeshnidae							3.6		0.4
COLEOPTERA (Beetles)									
Elmidae larvae				0.2	0.1	0.1	0.3		0.1
Elmidae adult						< 0.1			< 0.1
HYDRACARINA (Water mites)		1.5	4.2	2.7	3.6	3.9	3.6	9.5	3.6
DIPTERA (Midges and flies)									
Chironomidae larvae	17.8	8.0	31.0	18.0	14.4	11.6	11.2	20.3	16.5
Chironomidae pupae	2.8	4.0	3.1	4.6	10.5	11.3	10.6	20.4	8.4
Tipulidae					0.1		0.3		< 0.1
Chaoborus					0.1	2.0	1.9		0.5
Ceratopogonidae larvae		1.4	0.8	2.0	3.9	0.3	0.1		1.1
Ceratopogonidae pupae			0.8	0.1					0.1
Simulidae larvae				0.3	0.5	0.4	0.7		0.2

Table **3.88.** (cont.)

AGE CLASS	0+	1+	2+	3+	4+	5+	6+	7+	All ages
SAMPLE SIZE	19	25	11	62	164	187	139	2	609
Simulidae pupae				1.8	0.3		0.3		0.3
Sciomyzidae					0.1				< 0.1
COPEPODA (Copepods)									
Cyclopoid	11.4	12.5	2.6	3.6	4.2	4.9	1.0		5.0
Calanoid				0.2	0.1	0.2	0.1		0.1
CLADOCERA (Water fleas)									
Daphnidae	19.6	14.5	8.3	8.8	9.2	11.1	4.8		9.5
Chydoridae	6.4	14.1	6.3	7.0	6.8	6.1	6.9		6.7
Ceriodaphnia			1.3			0.8			0.1
Bosminidae						< 0.1			< 0.1
MYSIDACEA (Mysis shrimp)						1.7	0.4		0.3
AMPHIPODA (Scuds)									
Talitridae	4.6	9.6	4.5	6.5	6.6	6.5	7.1		5.7
OSTRACODA (Seed shrimp)									
Cyridae	4.0	1.9	15.5	1.6	1.8	2.2	0.8		3.5
GASTROPODA (Snails)									
Planorbidae			2.3	2.8	5.9	6.1	8.0		3.1
Lymnaeidae				0.3	3.6	3.0	3.3		1.3
Physidae				0.6	0.9	0.8	1.0		0.4
BIVALVIA (Clams)									
Sphaeriidae						0.1			0.1
OLIGOCHAETA (Worms)									
Lumbriculidae					0.1	1.4	2.8	24.2	3.6
Naididae						0.1	0.5		0.1
NEMATODA							0.1		< 0.1
TERRESTRIAL INSECTS						0.4			< 0.1
Corixidae						0.1	0.5		0.1
Cicadellidae						0.4			< 0.1
Macromiidae						0.1			< 0.1
Machilidae					0.6				0.1
ARACHNIDA (Spiders)					0.1				< 0.1
OSTEICHTHYES					0.1	1.2	1.3		0.3
Yellow perch							0.6		0.1

Chironomidae larvae (16.5%) was the most important prey item in the diet.

3.5.2 LARGEMOUTH BASS FEEDING HABITS

Three hundred and thirty six largemouth bass stomachs were analyzed in 1989. A total of 25 families of invertebrates were identified in their stomachs. Mean annual index of relative importance values for prey items consumed by largemouth bass are listed in Table 3.89. Baetidae (48.9%) had the highest IRI value for 0+ largemouth bass. For 1+ largemouth bass, Chironomidae pupae had the highest IRI value at 23.7 percent. Chydoridae had an IRI value of 17.8 percent, highest among 2+ largemouth bass. For 3+ largemouth bass, Baetidae had an IRI value of 27.3 percent followed by Osteichthyes (12.2%). Among 4+, 5+, and 6+ largemouth bass, Osteichthyes had the highest IRI value at 46.2 percent, 59.6 percent, and 50.0 percent, respectively. Of the identifiable fish in 5+ bass stomachs 20.5 percent were yellow perch. Of the identifiable fish in 6+ bass stomachs 76.4 percent were yellow perch. Osteichthyes made up 100 percent of prey items consumed by 8+, 9+, and 14+ largemouth bass. Of the identifiable fish in 8+, 9+, and 14+ bass stomachs 100 percent were yellow perch. For 1 1+ largemouth bass, Osteichthyes (100%) had the highest IRI value. For all ages combined, Osteichthyes was the major food item of largemouth bass.

3.5.3 MOUNTAIN WHITEFISH FEEDING HABITS

Two hundred and seventy-nine mountain whitefish stomachs were analyzed during 1989 and thirty-seven families of invertebrates were identified. IRI values for mountain whitefish in 1989 are listed in Table 3.90. Chironomidae larvae had the highest IRI value for all age classes of mountain whitefish. The IRI was 38.8 percent for 0+, 40.0 percent for 1+, 40.4 percent for 2+, 35.8 percent for 3+, 29.9 percent for 4+, and 41.8 percent for 5+. For all ages of mountain whitefish, Chironomidae larvae had an IRI of 37.8 percent.

3.5.4 BLACK CRAPPIE FEEDING HABITS

During 1989, 82 black crappie stomachs were analyzed. Fourteen families of invertebrates were identified in the stomachs. Table 3.91 lists IRI values of prey items consumed by black crappie. Cyclopoida (43.8%) had the largest IRI value for 0+ black crappie. For 1+ black crappie, Chydoridae (46.2%) had the highest IRI value.

Table **3.89.** Mean annual index of relative importance of prey items consumed by **largemouth** bass for **1989, Pend Oreille** River, WA.

AGE CLASS	0 +	1 +	2 +	3 +	4 +	5 +	6 +	8 +	9 +	11 +	14 +	All ages
SAMPLE SIZE	60	94	76	66	11	9	11	5	1	1	2	336
TRICHOPTERA (Caddisflies)												
Pschomyiidae	0.8											0.1
EPHEMEROPTERA (Mayflies)												
Baetidae	48.9	14.9	17.3	27.3	9.7	28.2	14.2					14.6
Tricorythidae			0.6									< 0.1
ODONATA (Damel and dragonflies)												
Coenagriidae	0.5	11.7	6.8	6.9	13.9	8.8						4.4
Aeshnidae				1.1								0.1
COLEOPTERA (Beetles)												
Hydrophilidae		0.2										< 0.1
HYDRACARINA (Water mites)		0.4	1.8									0.2
DIPTERA (Midges and flies)												
Chironomidae larvae	20.6	11.6	6.9	5.8	5.9							4.6
Chironomidae pupae	3.3	23.7	8.0	7.5								3.9
Ceratopogonidae		3.7	0.6	8.5								1.2
COPEPODA (Copepods)												
Cyclopoid	0.4	1.9	4.2									0.6
Calanoid		0.5										< 0.1
CLADOCERA (Water fleas)												
Daphnidae	9.4	9.6	11.2	0.7								2.8
Chydoridae	9.0	10.4	17.8	2.6	3.1	3.4	4.0					4.6
Leptidoridae			0.2									< 0.1
AMPHIPODA (Scuds)												
Talitridae	2.7	5.4	7.8	1.2	1.7		5.6					2.2
OSTRACODA (Seed shrimp)												
Cypridae		0.2	0.2									< 0.1
DECAPODA (Crayfish)												
Astacidae				0.5								< 0.1

Table **3.89.** (cont.)

AGE CLASS	0 +	1 +	2 +	3 +	4 +	5 +	6 +	8 +	9 +	11 +	14 +	All ages
SAMPLE SIZE	60	94	76	66	11	9	11	5	1	1	2	336
GASTROPODA (Snails)												
Planorbidae							6.5					0.6
BIVALVIA (Clams)												
Sphaeriidae		0.2										< 0.1
OLIGOCHAETA (Worms)												
Lumbriculidae			2.0				4.7					0.6
Naididae				0.3								< 0.1
NEMATODA												
TERRESTRIALS INSECTS	1.8	2.4	4.4	3.9	16.4							2.6
Simuliidae		0.2										< 0.1
Corixidae	0.5	0.2	0.8	1.8	3.0							0.6
Formicidae				0.2								< 0.1
Coenagriidae				7.9								0.7
Gerridae				1.5								0.1
ARACHNIDA (Spiders)		0.2	0.4									< 0.1
TOTAL OSTEICHTHYES	2.0	2.6	4.0	22.6	46.2	59.6	50.0	100.0	100.0	100.0	100.0	34.7
Yellow perch						12.2	38.2	100.0	100.0		100.0	31.8
Largemouth bass			2.2	4.9								0.6
Pumpkinseed				5.5			15.0					1.9
Unidentified Osteichthyes	2.0	2.6	1.8	12.2	46.2	47.4	11.8			100.0		20.4

Among 2+ black crappie, Chydoridae had the highest IRI value at 27.4 percent. Daphnidae had the highest IRI value for 3+ black crappie at 28.8 percent. Chironomidae larvae (14.9%) was the most important prey item among 4+ black crappie. For 5+ black crappie, Ceratopogonidae had the highest IRI value at 55.3 percent. Chironomidae pupae and larvae were the predominant food items consumed by 6+ black crappie at 57.7 and 42.3 percent, respectively. Chironomidae larvae (16.2%) was the most important prey item for all age classes of black crappie combined with an IRI.

3.5.5 BROWN TROUT FEEDING HABITS

Eighteen brown trout stomachs were analyzed and nineteen families of invertebrates were identified in the diet. The IRI values for prey items consumed by each age class of brown trout are listed in Table 3.92. Ephemerellidae had an IRI value of 100 percent for 0+ brown trout. For 1+ brown trout, the Coenagriidae IRI was also 100 percent. Chironomidae pupae had the highest IRI value for 2+ brown trout at 58.1 percent. Among 3+ brown trout, Baetidae had the highest IRI at 25.0 percent. For 7+ brown trout, Chironomidae pupae had the highest IRI at 39.4 percent, followed by Naididae (38.1%). In general, brown trout fed mainly on macroinvertebrates. For all age classes combined Coenagriidae had the highest IRI value at 21.3 percent, followed by Chironomidae pupae (20.1) and Ephemerellidae (20.0).

3.5.6 CUTTHROAT TROUT FEEDING HABITS

During 1989, 3 cutthroat trout stomachs were analyzed. Four families of invertebrates were identified in the cutthroat trout stomachs. Table 3.93 shows IRI values for cutthroat trout in the Pend Oreille River. Osteichthyes had the highest IRI values for 3+ and Chironomidae pupae had the highest IRI values for 4+. Chironomidae pupae had the highest IRI values for all age classes combined at 34.2%.

3.5.7 KOKANEE FEEDING HABITS

Three kokanee stomachs were analyzed during 1989. A total of 4 families of invertebrates were identified in the kokanee stomachs. Mean annual index of relative importance values for kokanee are listed in Table 3.94. Cyclopoida had the highest IRI value for 1+ kokanee at 37.6 percent, followed by Daphnidae (28.8%). For 2+

Table **3.90.** Mean annual index of relative importance of prey items consumed by mountain whitefish for **1989, Pend Oreille** River, WA.

AGE CLASS	0+	1+	2+	3+	4+	5+	All ages
SAMPLE SIZE	4	19	50	119	81	6	279
TRICHOPTERA (Caddisflies)							
Hydroptilidae	30.2	8.2	6.0	5.5	6.1	10.4	11.1
Limnephilidae			1.0	0.7	1.7		0.6
Leptoceridae			4.1	6.5	10.7	3.5	4.1
Phryganeidae				0.3	0.3		0.1
Hydropsychidae				0.1	0.1		< 0.1
Brachycentridae		1.1		0.9	0.5		0.4
Glossosomatidae		1.3		0.1			0.2
Psychomyiidae				0.2			< 0.1
EPHEMEROPTERA (Mayflies)							
Baetidae		4.4	2.8	1.9	3.2	3.3	2.6
Ephemerellidae				0.1			< 0.1
Heptageniidae				0.1			< 0.1
PLECOPTERA (Stoneflies)							
Nemouridae				0.1	0.1		< 0.1
Perlodidae					0.2		< 0.1
ODONATA (Damsel and dragonflies)							
Coenagriidae		1.4	1.1	2.5	3.1	3.2	1.9
Libellulidae					0.1		< 0.1
COLEOPTERA (Beetles)							
Elmidae larvae		1.3	0.2	0.9	0.8	1.7	0.8
HYDRACARINA (Water mites)		4.1	3.0	5.8	7.1	1.6	3.6
DIPTERA (Midges and flies)							
Chironomidae larvae	38.8	40.0	40.4	35.8	29.9	41.8	37.8
Chironomidae pupae	6.1	9.9	9.9	7.5	8.0	9.6	6.8
Tipulidae				0.1			< 0.1
Bibionidae				0.1	0.3		< 0.1
Ceratopogonidae		1.2	0.2	0.1			0.2
Muscidae				0.1			< 0.1
Simuliidae larvae	5.2	3.5	5.2	10.9	9.9		5.8
Simuliidae pupae	6.6	0.6	1.5	3.5			2.0
MEGALOPTERA (Alderflies)							
Sialidae				0.1		1.7	0.8
COPEPODA (Copepods)							
Cyclopoida			0.5	0.3	0.2	1.6	0.4
CLADOCERA (Water fleas)							
Daphnidae			0.2	1.1	0.3	3.2	0.8
Chydoridae	13.1	7.6	6.3	0.7	2.1		5.0
MYSIDACEA (Mysis shrimp)				0.3	0.3	1.6	0.4
AMPHIPODA (Scuds)							
Talitridae		5.8	3.4	3.6	5.7	9.4	4.6
Gammaridae			0.3	0.3	0.3		0.2
OSTRACODA (Seed shrimp)			1.1	0.2	0.4		0.3
GASTROPODA (Snails)							
Planorbidae		1.4	3.1	1.2	0.7	1.7	1.4
Lymnaeidae		4.2	3.3	0.7	2.6	1.7	2.1
BIVALVIA (Clams)							
Sphaeriidae		1.1	2.5	0.2	0.3	1.7	1.0
OLIGOCHAETA (Worms)							
Lumbriculidae			0.2	0.9	1.8	2.4	0.9
Naididae					3.4		0.6
NEMATODA				0.1			< 0.1
TERRESTRIAL INSECTS			2.3	2.0			0.6
Aphididae			1.6				0.3

Table **3.91.** Mean annual index of relative importance of prey items consumed by black crappie for **1989, Pend Oreille** River, WA.

AGE CLASS	0+	1+	2+	3+	4+	5+	6+	All ages
SAMPLE SIZE	23	8	8	17	23	2	1	82
TRICHOPTERA (Caddisflies)								
Hydroptilidae					1.8			0.2
EPHEMEROPTERA (Mayflies)								
Baetidae	2.4	3.2		4.1	8.1	5.0		3.2
Tricorythidae				3.5	1.3	7.2		1.7
PLECOPTERA (Stoneflies)								
Nemouridae		1.6						0.2
ODONATA (Damsel and dragonflies)								
Coenagriidae			7.4		3.1	5.0		2.2
HYDRACARINA (Water mites)				3.5	1.7	5.0		1.4
LEPIDOPTERA (Moths)					0.6			0.1
DIPTERA (Midges and flies)								
Chironomidae larvae	17.3	1.6	10.8	15.0	14.9	12.4	42.3	16.3
Chironomidae pupae		1.6	10.8	3.1	6.3		57.7	11.4
Ceratopogonidae			11.6	13.8	10.3	55.3		13.0
Simuliidae					0.5			0.1
COPEPODA (Copepods)								
Cyclopoida	43.8	8.8	27.4	8.9	4.3	5.0		14.0
CLADOCERA (Water fleas)								
Daphnidae	14.6			28.8	3.7			6.7
Chydoridae	16.3	46.2		1.8	10.9			10.7
Ceriodaphnia		30.2	19.4		10.0			8.5
AMPHIPODA (Scuds)								
Talitridae	1.9	3.2	12.8	9.8	13.6	5.0		6.6
OSTRACODA (Seed shrimp)	3.6	3.2		4.4	6.8			2.6
TERRESTIAL INSECTS				3.2	1.4			0.6
Corixidae					0.9			0.1

Table **3.92.** Mean annual index of relative importance of prey items consumed by brown trout for **1989, Pend Oreille** River, WA.

AGE CLASS	0+	1+	2+	3+	7+	All ages
SAMPLE SIZE	1	1	5	10	1	18
TRICHOPTERA (Caddisflies)						
Leptoceridae				4.7		0.9
EPHEMEROPTERA (Mayflies)						
Baetidae			6.4	25.0	22.5	10.8
Ephemerellidae	100.0					20.0
ODONATA (Damsel and dragonflies)						
Coenagriidae		100.0		6.4		21.3
Lestidae				2.2		0.4
Aeshnidae				15.8		3.2
COLEOPTERA (Beetles)						
Elmidae larvae				5.9		1.2
Dytiscidae				2.4		0.5
LEPIDOPTERA (Moths)				3.0		0.6
DIPTERA (Midges and flies)						
Chironomidae larvae				2.2		0.4
Chironomidae pupae			58.1	2.9	39.4	20.1
Ceratopogonidae			8.6			1.7
AMPHIPODA (Scuds)						
Talitridae			5.7	7.7		2.7
Gammaridae				2.2		0.4
GASTROPODA (Snails)						
Planorbidae				13.8		2.8
Lymnaeidae				2.5		0.5
Physidae				3.3		0.7
OLIGOCHAETA (Worms)						
Naididae					38.1	7.6
OSTEICHTHYES			21.2			4.2

Table **3.93.** Mean annual index of relative importance of prey items consumed by cutthroat trout for **1989, Pend Oreille** River, WA.

AGE CLASS	3 +	4 +	All ages
SAMPLE SIZE	1	2	3
PLECOPTERA (Stoneflies)	17.7	8.2	13.0
ODONATA (Damsel and dragonflies)			
Coenagriidae		8.2	4.1
COLEOPTERA (Beetles)		8.2	4.1
DIPTERA (Midges and flies)			
Chironomidae larvae		16.5	8.2
Chironomidae pupae	28.3	40.0	34.2
CLADOCERA (Water fleas)			
Daphnidae	19.6		9.8
GASTROPODA (Snails)			
Planorbidae		12.5	6.2
OSTEICHTHYES	34.3	6.2	20.2

Table **3.94.** Mean annual index of relative importance of prey items consumed by **kokanee** for **1989, Pend Oreille** River, WA.

AGE CLASS	1 +	2 +	All ages
SAMPLE SIZE	2	1	3
DIPTERA (Midges and flies)			
Chironomidae larvae	11.2		5.6
Chironomidae pupae	11.2		5.6
COPEPODA (Copepods)			
Cyclopoida	37.6		18.8
CLADOCERA (Water fleas)			
Daphnidae	28.8	100.0	64.4
Chydoridae	11.2		5.6

kokanee, Daphnidae made up 100 percent of the IRI value. Daphnidae were the most important prey item among all age classes of kokanee at 64.4 percent.

3.5.8 NON-TARGET SPECIES FEEDING HABITS

Non-target species consisted of pumpkinseed, brown bullhead, tench, peamouth, northern squawfish, largescale sucker, and longnose sucker. Stomachs of non-target species were only taken periodically, so sample sizes were small. Analysis of non-target species stomachs, consisting of number, weight, and occurrence frequencies as well as index of relative importance can be found in Appendix F.

Ostracoda had the highest IRI value for all ages of longnose sucker at 17.7 percent, followed by Nematoda (17.5%). For all age classes of largescale sucker, Chironomidae larvae (20.3 percent) was most important in the diet followed by Ostracoda (17.5%). Among all age classes of tench, Chironomidae larvae was found to have the highest IRI value at 17.7 percent. Nematoda was found to be most important prey item in the squawfish diet with an IRI of 24.8 percent. For all age classes of pumpkinseed, Chironomidae larvae had the highest IRI value at 21.3 percent. For peamouth, Talitridae had the highest IRI value (25.8%), followed by Ceratopogonidae (11.3%) and Nematoda (11.2%). Chironomidae larvae had the highest IRI value for brown bullhead at 23.4 percent, followed by Planorbidae (10.9%).

3.5.9 DIET OVERLAPS

Diet overlaps between major fish species found in the Pend Oreille River are listed in Table 3.95. A high degree of overlap ($\geq$ 0.7) was found between: yellow perch and black crappie; yellow perch and brown bullhead; yellow perch and largescale sucker; mountain whitefish and pumpkinseed; mountain whitefish and largescale sucker; black crappie and largescale sucker; tench and pumpkinseed; brown bullhead and pumpkinseed; largescale sucker and pumpkinseed; longnose sucker and pumpkinseed; brown bullhead and tench; brown bullhead and largescale sucker; tench and largescale sucker; tench and longnose sucker; and largescale sucker and longnose sucker.

Table 3.95. **Annual diet overlaps between fish species based on relative importance values for 1989, Pend Oreille River, WA.**

	Yellow perch N = 609	Lrgmouth bass N = 336	Mountain whitefish N = 279	Black crappie N = 82	Pumpkin-seed N = 114	Brown trout N = 18	Cutthroat trout N = 3	Kokanee N = 3	Brown bullhead N = 24	Tench N = 27	Peamouth N = 11	Northern squawfish N = 38	Largescale sucker N = 32	Longnose sucker N = 34
Yellow perch	1.00	0.336	0.665	0.730	0.739	0.438	0.402	0.324	0.764	0.649	0.334	0.211	0.722	0.494
Largemouth bass		1.00	0.164	0.202	0.158	0.265	0.339	0.084	0.176	0.138	0.087	0.406	0.185	0.104
Mountain whitefish			1.00	0.581	0.769	0.154	0.305	0.106	0.144	0.651	0.225	0.215	0.709	0.488
Black crappie				1.00	0.680	0.280	0.393	0.322	0.659	0.657	0.420	0.201	0.715	0.534
Pumpkinseed					1.00	0.169	0.282	0.172	0.870	0.810	0.603	0.242	0.844	0.707
Brown trout						1.00	0.508	0.038	0.174	0.233	0.194	0.185	0.168	0.126
Cutthroat trout							1.00	0.264	0.259	0.381	0.202	0.337	0.255	0.187
Kokanee								1.00	0.262	0.096	0.020	0.034	0.140	0.079
Brown bullhead									1.00	0.772	0.413	0.226	0.801	0.619
Tench										1.00	0.516	0.258	0.821	0.794
Peamouth											1.00	0.420	0.385	0.607
Northern squawfish												1.00	0.255	0.518
Largescale sucker													1.00	0.765
Longnose sucker														1.00

Diet overlaps between largemouth bass year classes and other fish species found in the Pend Oreille River are listed in Table 3.96. High overlaps were between: 1+ largemouth bass and yellow perch (0.82); 2+ largemouth bass and yellow perch (0.84) and 1+ largemouth bass and brown trout (0.77). Medium range overlaps (>0.5) were common among largemouth bass year classes and other major fish species found in the Pend Oreille River.

High and moderate diet overlaps between largemouth bass year classes and yellow perch year classes were common in the Pend Oreille River (Table 3.97). High diet overlaps were between: 1+ largemouth bass and 0+ yellow perch (0.73); 2+ largemouth bass and 0+ yellow perch; 1+ largemouth bass and 1+ yellow perch (0.74); and 2+ largemouth bass and 1+ yellow perch (0.86). Three year old yellow perch had high overlaps with 0+, 1+, 2+ and 3+ largemouth bass at (0.91), (0.71), (0.79), and (0.75), respectively. Four year old yellow perch had high diet overlaps with 1+ largemouth bass (0.85) and 2+ largemouth bass (0.84). One and two year old largemouth bass had high overlaps with 5+ yellow perch at (0.81) and (0.80), respectively. One and two year old largemouth bass also had high diet overlaps with 6+ yellow perch (both at 0.81).

3.5.10 PREY SELECTION (ELECTIVITY)

3.5.10.1 BENTHIC MACROINVERTEBRATE ELECTIVITY

Prey selection for benthic macroinvertebrates consumed by target fish species found in the Pend Oreille River are listed in Table 3.98. Yellow perch had the highest electivities for Baetidae and Limnephilidae with values of 0.17 and 0.07, respectively. Largemouth bass had the highest electivity for Baetidae at 0.44. Mountain whitefish had the highest electivity for Chironomidae larvae at 0.21. Black crappie selected for Ceratopogonidae larvae most often at 0.28. Brown trout, cutthroat trout and kokanee had the highest electivity for Chironomidae pupae at 0.16, 0.95, and 0.49, respectively.

Electivities of non-target fish species are listed in Table 3.99. Pumpkinseed selected for Hydroptilidae most often at 0.05. Brown bullhead and longnose suckers selected most often for Ceratopogonidae larvae, both at 0.08. Tench selected for Sphaeriidae most often at 0.18. Talitridae was selected for by peamouth at 0.15.

Table **3.96.** Annual diet overlaps between largemouth bass **(LMB)** year classes and other fish species based on relative importance values for **1989, Pend Oreille** River, WA.

	N	Yellow perch	Mountain whitefish	Black crappie	Pumpkinseed	Brown trout	Cutthroat trout	Kokanee	Brown bullhead	Tench	Peamouth	Northern squawfish	Largescale sucker	Longnose sucker
		N=609	N=279	N=82	N=114	N=18	N=3	N=3	n=24	N=27	N=11	N=38	N=32	N=34
0+ LMB	60	0.64	0.42	0.37	0.28	0.31	0.17	0.21	0.37	0.26	0.08	0.10	0.36	0.20
1+ LMB	94	0.82	0.49	0.69	0.42	0.77	0.67	0.31	0.48	0.51	0.31	0.28	0.55	0.34
2+ LMB	76	0.84	0.38	0.64	0.39	0.50	0.34	0.35	0.48	0.38	0.28	0.22	0.60	0.31
3+ LMB	66	0.54	0.25	0.38	0.21	0.57	0.36	0.05	0.28	0.25	0.17	0.40	0.28	0.20
4+ LMB	11	0.21	0.14	0.11	0.11	0.31	0.44	0.01	0.13	0.07	0.06	0.36	0.12	0.06
≥5+ LMB	29	0.01	0.00	0.00	0.00	0.02	0.08	0.00	0.00	0.00	0.00	0.07	0.00	0.00

Table **3.97.** Annual diet overlaps between largemouth bass **(LMB)** year class and yellow perch classes based on relative importance values for **1989, Pend Oreille** River, WA.

	N	0+ Yellow perch N=25	1+ Yellow perch N=11	2+ Yellow perch N=62	3+ Yellow perch N=164	4+ Yellow perch N=187	5+ Yellow perch N=139	6+ Yellow perch N=2	7+ Yellow perch N=2
0+ LMB	60	0.64	0.50	0.48	0.91	0.64	0.51	0.60	0.39
1+ LMB	94	0.73	0.74	0.56	0.71	0.85	0.81	0.81	0.55
2+ LMB	76	0.77	0.86	0.52	0.79	0.84	0.80	0.81	0.37
3+ LMB	66	0.53	0.48	0.32	0.75	0.66	0.51	0.65	0.34

Table **3.98.** Prey selection **(electivity)** for **benthic** macroinvertebrates by target species fish for **1989, Pend Oreille** River, WA.

	%[1]	Yellow perch	Largemouth bass	Mountain whitefish	Black crappie	Brown trout	Cutthroat trout	Kokanee
	N = 609	N = 336	N = 279	N = 82	N = 18	N = 3	N = 3	
TRICHOPTERA (Caddisflies)								
Hydroptilidae	0.968	0.027	-0.01	0.08	-0.009	-0.01	-0.01	-0.01
Hydropsychidae	0	0	0	0.001	0	0	0	0
Leptoceridae	0.337	0.007	-0.003	0.012	-0.003	0.001	-0.003	-0.003
Limnephilidae	0.015	0.076	0	0.001	0	0	0	0
Brachycentridae		0	0	0.002	0	0	0	0
Phryganeidae	0.009	0.001	0	0	0	0	0	0
Glossosomatidae	0.004	0	0	0.002	0	0	0	0
Polycentropodidae	0.064	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
EPHEMEROPTERA (Mayflies)								
Baetidae	0.495	0.17	0.442	-0.001	0	0.001	-0.005	-0.005
Leptophlebiidae	0.003	0	0	0	0	0	0	0
Ephemeridae	0.002	0	0	0	0	0	0	0
Ephemerellidae	0.005	0	0	0	0	0.2	0	0
Tricorythidae	5.38	-0.053	-0.054	-0.054	-0.024	-0.054	-0.054	-0.054
Heptageniidae	0.003	0	0	0	0	0	0	0
ODONATA (Damsel and dragonflies)								
Coenagriidae	0.98	0.047	0.049	-0.008	-0.008	0.21	-0.009	-0.01
Macromiidae	0.009	0	0	0	0	0	0	0
Corduliidae	0.022	0	0	0	0	0	0	0
Lestidae		0	0	0	0	0.001	0	0
Aeshnidae		0.001	0.001	0	0	0.007	0	0
COLEOPTERA (Beetles)		0	0	0	0	0	0.001	0
Elmidae adult	0.844	-0.008	-0.008	-0.004	-0.008	-0.008	-0.008	-0.008
Elmidae larvae	0.061	0	-0.001	-0.001	-0.001	0.029	-0.001	-0.001

[1] [%] is the percent composition of **benthic macroinvertebrates** in dredges

Table **3.98.** (cont.)

Dytiscidae	0.004	0	0	0	0	0.001	0	0
Hydrophilidae	0.002	0	0	0	0	0	0	0
HYDRACARINA (Water mites)	4.692	-0.016	-0.049	-0.038	-0.047	-0.049	-0.049	-0.049
LEPIDOPTERA (Moths)	0.002	0	0	0	0	0.002	0	0
DIPTERA (Midges and flies)								
Chironomidae larvae	50.967	-0.224	-0.39	0.21	-0.04	-0.509	-0.505	-0.01
Chironomidae pupae	0.85	0.156	0.102	0.022	0.112	0.162	0.952	0.492
Ceratopogonidae larvae	2.439	-0.016	-0.008	-0.023	0.276	-0.023	-0.024	-0.024
Chaoboridae	0.017	0.003	0	0	0	0	0	0
Simuliidae larvae	0.242	0.001	-0.002	0.08	-0.002	-0.002	-0.002	-0.002
Simuliidae pupae		0.001	0	0.005	0	0	0	0
Tipulidae	0.048	0	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
Bibionidae		0	0	0.001	0	0	0	0
Psychodidae	0.006	0	0	0	0	0	0	0
Empididae	0.363	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004
AMPHIPODA (Scuds)								
Talitridae	9.981	-0.056	-0.06	-0.092	-0.067	-0.08	-0.1	-0.1
OSTRACODA (Seed shrimp)								
Cypridae		0.038	0	0	0.011	0	0	0
GASTROPODA (Snails)								
Planorbidae	3.998	0.003	-0.02	-0.039	-0.04	-0.02	-0.039	-0.04
Lymnaidae	0.457	-0.001	-0.005	-0.003	-0.005	-0.004	-0.005	-0.005
Physidae	2.359	0.002	0	0	0	0.001	0	0
BIVALVIA (Clams)								
Sphaeriidae		-0.023	-0.024	-0.023	-0.024	-0.024	-0.024	-0.024
ARACHNIDA (Spiders)		0	0.022	0	0	0	0	0
OLIGOCHAETA		0	0	0	0	0	0	0
Lumbriculidae	8.249	-0.065	-0.083	-0.08	-0.083	0.068	-0.083	-0.083
HIRUDINEA	0.07	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
PLATYHELMINTHES								
Planariidae	0.372	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004

[1] [%] is the percent composition of *benthic macroinvertebrates in dredges*

Table **3.99.** Prey selection **(electivity)** for **benthic** macroinvertebrates by non-target fish species for **1989, Pend Oreille** River, WA.

	%[1]	Pumpkin seed	Brown bullhead	Tench	Peamouth	Northern squawfish	Largescale sucker	Longnose sucker
	N = 114	N = 24	N =27	N = 11	N = 38	N = 32	N = 34	
TRICHOPTERA (Caddisflies)								
Hydroptilidae	0.968	0.05	-0.008	0.01	-0.01	-0.009	-0.006	-0.008
Leptoceridae	0.337	0.005	0	0.017	-0.003	-0.003	-0.003	-0.003
Limnephilidae	0.015	0.001	0	0	0	0	0	0
Phryganeidae	0.009	0	0	0	0	0	0	0
Glossosomatidae	0.004	0	0	0	0	0	0	0
Polycentropodidae	0.064	0.003	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
EPHEMEROPTERA (Mayflies)								
Baetidae	0.495	-0.002	0.002	-0.001	-0.005	-0.005	0.035	-0.005
Leptophlibidae	0.003	0	0	0	0	0	0	0
Ephemeridae	0.002	0	0	0	0	0	0	0
Ephemerellidae	0.005	0	0	0	0	0	0	0
Tricorythidae	5.38	-0.052	-0.054	-0.054	-0.054	-0.054	-0.054	-0.054
Heptageniidae	0.003	0	0	0	0	0	0	0
PLECOPTERA (Stoneflies)								
Chloroperlidae	0	0.001	0	0	0	0	0	0
ODONATA (Damsel and dragonflies)								
Coenagriidae	0.98	-0.003	0.048	-0.01	-0.01	-0.009	-0.009	-0.01
Macromiidae	0.009	0	0	0	0	0	0	0
Corduliidae	0.022	0	0	0	0	0	0	0
Aeshnidae		0	0	0	0	0.02	0	0
COLEOPTERA (Beetles)								
Elmidae adult	0.844	-0.008	-0.008	-0.008	0.115	-0.008	-0.008	-0.008
Elmidae larvae	0.061	0.017	0	-0.001	0.001	-0.001	0.029	0.002
Curculionidae		0.001	0	0	0	0	0	0

[1] [%] is the percent composition of benthic macroinvertebrates in dredges

Table **3.99.** (cont.)

Dytiscidae	0.004	0	0	0	0	0	0	0
Hydrophilidae	0.002	0	0	0	0	0	0	0
HYDRACARINA (Water mites)	4.692	-0.032	-0.048	-0.039	-0.049	-0.048	-0.039	-0.009
LEPIDOPTERA (Moths)	0.002	0	0	0	0	0	0	0
DIPTERA (Midges and flies)								
Chironomidae larvae	50.967	-0.18	-0.01	-0.31	-0.505	-0.41	-0.12	-0.31
Chironomidae pupae	0.85	0.027	-0.007	0.072	0.112	0.092	0.054	-0.005
Ceratopogonidae larvae	2.439	0.036	0.076	0.016	0.001	-0.022	-0.004	0.076
Ceratopogonidae pupae		0	0.002	0	0	0	0	0
Chaoboridae	0.017	0	0	0	0	0	0	0
Simuliidae larvae	0.242	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002
Tipulidae	0.048	0.017	-0.001	-0.001	-0.001	0.001	0.004	-0.001
Psychodidae	0.006	0	0	0	0	0	0.001	0
Empididae	0.363	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004
AMPHIPODA (Scuds)								
Talitridae	9.981	0	-0.06	-0.07	0.15	-0.09	-0.094	-0.096
OSTRACODA (Seed shrimp)								
Cypridae		0.1	0.02	0.3	0.125	0	0.2	0.4
GASTROPODA (Snails)		0	0	0	0	0	0	0
Planorbidae	3.998	0.01	0.04	0.01	0.093	-0.038	0.02	-0.034
Lymnaeidae	0.457	0.002	0.005	-0.005	0.037	0.035	0.005	-0.005
Physidae	2.359	0	0.002	0	0	0	0	0
BIVALVIA								
Sphaeriidae		-0.021	0.016	0.176	0.026	-0.023	0.006	-0.015
OLIGOCHAETA								
Lumbriculidae	8.249	-0.058	0.018	-0.074	-0.081	-0.073	-0.023	-0.08
HIRUDINEA	0.07	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
PLATYHELMINTHES								
Planariidae	0.372	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004

[1] [%] is the percent composition of benthic macroinvertebrates in dredges

Northern squawfish and largescale suckers selected for Chironomidae pupae most at 0.09 and 0.05, respectively.

3.5.10.2 ZOOPLANKTON ELECTIVITY

Electivity indices of zooplankton consumption by fish in the Pend Oreille River are listed in Table 3.100. Yellow perch selected most for Daphnidae at 0.42. For largemouth bass, Chydoridae was most often selected for at 0.31 followed by Daphnidae at 0.21. Chydoridae was selected for most by mountain whitefish at 0.79. Among black crappie and pumpkinseed, Daphnidae was most often selected for at 0.34 and 0.47, respectively. Cutthroat trout and kokanee also preferred Daphnidae at 0.77 and 0.43, respectively. Daphnidae was most often selected by brown bullhead at 0.25. Tench, northern squawfish, largescale suckers, and longnose suckers selected for Chydoridae most often, with electivities of 0.61, 0.483, 0.72, and 0.71, respectively.

3.6 TRIBUTARY FISH FEEDING HABITS

Analysis of tributary fish feeding habits was not final at the completion of this report. These data will be presented in a later publication.

3.7 FISH MOVEMENT AND MIGRATION

Fish that simply moved from a river site to an adjacent slough site or vice versa were not counted as having moved. Largemouth bass caught in a bass tournament and noted as having been released at BT-2B were released in the river adjacent to site 2B and Campbell Slough. Recaptures of these bass in 2B or Campbell Slough were not included as fish movement.

None of the black crappie or brown trout recaptured during electrofishing or gill netting had moved from the location of tagging (Table 3.101). Sixteen of 68 largemouth bass recaptures were recaptured at locations other than where they were tagged. The greatest distance any fish moved was 44 km by a largemouth bass caught during a bass tournament. This fish was tagged and released in May, 1989 at site 2B, and recaptured later that month at site 1 B. Two other largemouth bass had moved more than 20 km, one 21.5 km (site 2B to 9), and another 25 km (site 11 to 6A). Nine of the 16 largemouth bass that displayed movement had been displaced by bass fishermen participating in bass tournaments.

Table **3.100.** Prey selection **(electivity)** for **zooplankton** by fish species for **1989, Pend Oreille** River, WA.

	%[1]	Yellow perch	Largemouth bass	Mountain whitefish	Black crappie	Pumpkin seed	Cutthroat trout	Kokanee	Brown bullhead	Tench	Northern squawfish	Largescale sucker	Longnose sucker
COPEPODA		N = 609	N=336	N=279	N = 82	N = 114	N = 3	N = 3	N = 24	N = 27	N = 38	N = 32	N = 34
Calanoida	25.24	-0.05	-0.049	-0.283	0.006	-0.276	-0.284	0.056	0.01	-0.072	-0.284	-0.266	-0.274
Harpacticoida	1.94	-0.019	-0.019	-0.019	-0.019	-0.019	-0.052	-0.052	-0.052	-0.052	-0.052	-0.052	-0.052
							-0.019	-0.019	-0.019	-0.019	-0.019	-0.019	
CLADOCERA													
Daphnidae	23.55	0.421	0.212	-0.211	0.336	0.468	0.765	0.425	0.251	-0.236	0.098	~~-0.157~~	~~0.14~~
Chydoridae	18.39	-0.014	0.308	0.788	-0.045	0.105	-0.184	-0.183	0.036	0.604	0.483	0.72	0.711
Bosminidae	20.61	-0.206	-0.206	-0.206	-0.206	-0.206	-0.206	-0.206	-0.206	-0.206	-0.206	-0.206	-0.206
Sididae	1.86	-0.019	-0.019	-0.019	-0.019	-0.019	-0.019	-0.019	-0.019	-0.019	-0.019	-0.019	-0.019
Leptidoridae	0.01	0	0	0	0	0	0	0	0	0	0	0	0
MYSIDACEA	0	0.003	0	0.002	0	0	0	0	0	0	0	0	0

1 [%] is the percent composition in zooplankton tows.

Seven largescale suckers, out of 40 recaptures, were caught at a location other than where they were tagged (Table 3.101). Two moved the 31 km between sites 1 and 2, one moved 17 km, and the other four moved less than 4 km each. Fourteen longnose suckers were recaptured and 4 had changed location. One moved 7 km (site 6 to 3) the other 3 moved less than 1.5 km each. Five out of 54 mountain whitefish recaptures had moved. The greatest distance moved by a mountain whitefish was 49 km (site 11 to 2). One mountain whitefish moved 18 km (site 4 to 2) and one moved 17 km (site 3A to 2). Two of 16 northern squawfish recaptures were caught at a location other than where they were tagged. One had moved 31 km (site 1 to 2) and the other 2 km (site 9 to 8). One rainbow trout was recaptured and had moved 6 km, from site 5 to 3A. Twenty-nine yellow perch were recaptured and four had moved to a new location. The greatest distance moved by a yellow perch was 13 km, from site 9 to 4A. The other perch moved 5 km (site 8 to 6), 3.5 km (site 7 to 5A), and 1.5 km (site 4 to 3A).

Table 3.102 shows the tagging and recapture locations of fish caught by anglers. One black crappie, caught by an angler 5 miles south of lone, had moved 41 km from its tagging location at site 4A. Most of the tagged bass caught by anglers were caught during bass tournaments at unspecified locations. Of the six bass caught by anglers that knew where they caught them, two had moved from the location they were tagged. One had moved 13 km from site 2B to Cusick, WA and the other moved 1.6 km from site 4A to 3A. One mountain whitefish was caught by an angler and it had moved 29 km, from site 11 to 2.5 miles north of Usk, WA.

University of Idaho (U of I) researchers provided information on 13 tagged fish they recovered during electrofishing, gill netting, and beach seining on the Pend Oreille River during 1989 (Table 3.103). Three brown trout were captured and two had moved from site 3A to site 8A (12 km). Six of the 8 tagged largemouth bass caught by U of I researchers had changed location. Three of the six were largemouth bass displaced by bass anglers. The greatest distance traveled was 11 km (site 8 to 10). One tagged mountain whitefish was caught and had moved 1.6 km (site 3A to 4).

Table 3.104 shows the mean monthly and annual growth increments for each age class of brown trout, largemouth bass, and mountain whitefish based upon their growth between tagging and recapture. Brown trout growth ranged from no growth, at 4+, to 65

Table **3.101.** Tagging and recapture information on fish recaptured during **electrofishing** and gill netting surveys from Nov., **1988** through Dec., **1989.** The tagging location of recaptures with non-numbered tags was reported as the river site with that color tag even though it may have been tagged in an adjacent slough that received the same color tag (e.g., sites **4, 4A,** and **4B** all received lavender tags). The location **BT-2B** indicates the fish was captured at an unknown location during a bass tournament and was released at site **2B.**

SPECIES	LOCATION TAGGED	DATE TAGGED	LENGTH AT TAGGING (mm)	TAG #/COLOR	LOCATION RECAPTURED	DATE RECAPTURED	LENGTH AT RECAPTURE (mm)
Black crappie	3			Yellow	4A	Apr-89	200
Black crappie	4			Lavender	4A	Sep-89	182
Brown trout	1			Blue	1	Apr-89	206
Brown trout	3			Yellow	9	May-89	305
Brown trout	3A	Jul-89	369	OR 04939	3A	Aug-89	363
Brown trout	3A	Jul-88	497	OR 09287	3A	Aug-89	507
Brown trout	3A	Jul-88	467	OR 09294	3A	Oct-89	483
Brown trout	3A	Jul-88	454	OR 09298	3A	Jul-89	483
Brown trout	3A	Aug-88	606	OR 09525	3A	Aug-89	634
Brown trout	3A	Aug-88	623	OR 09593	3A	Jul-89	611
Brown trout	3A	Sep-88	435	OR 09687	3A	Jul-89	477
Brown trout	3A	Aug-88	502	OR 10238	3A	Jul-89	512
Brown trout	3A	Aug-88	428	OR 10243	3A	Jul-89	534
Brown trout	3A	Sep-88	483	OR 10244	3A	Jul-89	453
Brown trout	3A					Jul-89	523
Brown trout	3A	Aug-89	441	OR 10326	3A	Nov-89	444
Brown trout	3A	Aug-89	565	OR 10340	3A	Sep-89	551
Brown trout	3A	Nov-88	379	OR 10652	3A	Aug-89	422
Brown trout	3B	Oct-88	233	OR 09664	3B	[illegible]	236
Brown trout	5	Mar-88	280	OR 04973	5	Apr-89	300
Brown trout	8A	Jul-89	472	YL 19113	8A	Aug-89	478
Brown trout	8A	Aug-89	600	YL 19131	8A	Sep-89	610
Brown trout	T3			Yellow	3B	Mar-89	[illegible]
Largemouth bass	BT-2B	Jun-89	364	BR 21515	2B	Jun-89	364
Largemouth bass	BT-2B	Jun-89	353	BR 21516	2B	Jun-89	352
Largemouth bass	BT-2B	Jun-89	382	BR 21562	Campbell Sl.	Jun-89	382
Largemouth bass	BT-2B	Jun-89	389	BR 21588	2B	Jun-89	387
Largemouth bass	BT-2B	Jun-89	376	BR 21629	Campbell Sl.	Jun-89	376
Largemouth bass	BT-2B	Jun-89	388	BR 21640	Campbell Sl.	Jun-89	384
Largemouth bass	BT-2B	Jun-89	388	BR 21640	Campbell Sl.	Jun-89	383
Largemouth bass	BT-2B	Jun-89	320	BR 21658	Campbell Sl.	Jun-89	330
Largemouth bass	BT-2B	Jun-89	356	BR 21666	Campbell Sl.	Jun-89	356
Largemouth bass	BT-2B	Jun-89	366	BR 21678	3A	Jun-89	370
Largemouth bass	BT-2B	Jun-89	294	BR 21691	2B	Jun-89	296
Largemouth bass	BT-2B	Jun-89	346	BR 21694	2B	Jun-89	346
Largemouth bass	BT-2B	Jun-89	364	BR 21697	2B	Jun-89	353
Largemouth bass	BT-2B	Jun-89	302	BR 21698	2B	Jun-89	305
Largemouth bass	BT-2B	Jun-89	366	BR 21715	Campbell Sl.	Jun-89	365
Largemouth bass	BT-2B	Jun-89	374	BR 21776	2B	Jun-89	375
Largemouth bass	BT-2B	Jun-89	412	BR 21792	Campbell Sl.	Jun-89	407
Largemouth bass	BT-2B	Jun-89	320	BR 21815	2B	Jun-89	317
Largemouth bass	BT-2B	Jun-89	337	BR 21819	2B	Jun-89	334
Largemouth bass	BT-2B	Jun-89	436	OR 21717	6	Aug-89	432
Largemouth bass	BT-2B	May-89	382	YL 18027	2B	Jun-89	382
Largemouth bass	BT-2B	May-89	313	YL 18049	2B	Jun-89	308
Largemouth bass	BT-2B	May-89	356	YL 18056	2B	Jun-89	444
Largemouth bass	BT-2B	May-89	408	YL 18063	2B	Jun-89	409

Table **3.101.** (cont.)

SPECIES	LOCATION TAGGED	DATE TAGGED	LENGTH AT TAGGING (mm)	TAG #/COLOR	LOCATION RECAPTURED	DATE RECAPTURED	LENGTH AT RECAPTURE (mm)
Largemouth bass	BT-2B	May-89	330	YL 18376	4A	May-89	334
Largemouth bass	BT-2B	May-89	309	YL 18388	4A	Jun-89	304
Largemouth bass	BT-2B	May-89	378	YL 18389	4A	May-89	382
Largemouth bass	BT-2B	May-88	395	YL1.8404	2B	Jun-89	401
Largemouth bass	BT-2B	May-89	420	YL .18414	1B	Mav-89	426
Largemouth bass	BT-2B	May-89	381	YL 18445	4A	May-89	390
Largemouth bass	BT-9A	Aug-88	324	YL .12535	9A	May-89	325
Largemouth bass	Campbell Sl.	Jun-89	391	YL 07826	Campbell Sl.	Jun-89	385
Largemouth bass	Campbell Sl.	Jun-89	189	YL 07839	Campbell Sl.	Jun-89	187
Largemouth bass	1B	May-88	397	YL 08001	1B	Jun-89	421
Largemouth bass	1B	May-88	295	YL 08729	1B	Jun-89	324
Largemouth bass	1B	May-88	200	YL 08744	1B	Jun-89	211
Largemouth bass	1B	Jun-88	330	YL 13408	1B	Jun-89	358
Largemouth bass	1B	May-88	265	YL 13413	1B	Jun-89	307
Largemouth bass	2			Salmon	2	Nov-88	145
Largemouth bass	2	Jun-89	167	YL 13863	2	Jul-89	184
Largemouth bass	2B	Jun-89	189	YL 07293	6	Jul-89	197
Largemouth bass	2B	Jun-89	185	YL 07852	2B	Jun-89	185
Largemouth bass	2B	Jun-89	198	YL 07908	2B	Jun-89	203
Largemouth bass	2B	Jun-89	376	YL 08397	9	Aug-89	380
Largemouth bass	2B	Jun-89	200	YL 20984	2B	Jun-89	196
Largemouth bass	2B	Jun-89	177	YL 20988	2B	Jun-89	182
Largemouth bass	2B	Jun-89	195	YL 20994	2B	Jun-89	195
Largemouth bass	3			Yellow	3A	Nov-89	211
Largemouth bass	3C	May-88	257	OR 05212	9A	May-89	291
Largemouth bass	4			Lavender	4A	Nov-89	225
Largemouth bass	AA	Apr-89	338	OR 04907	5A	Jun-89	344
Largemouth bass	4A	Apr-89	460	OR 09877	4A	Jun-89	457
Largemouth bass	4A	Jun-89	267	YL 12234	4A	Sep-89	304
Largemouth bass	4B	May-88	288	OR 05197	2B	Jun-89	334
Largemouth bass	5	Aug-88	268	OR 05109	5A	Apr-89	289
Largemouth bass	5	Dec-88	490	OR 10124	4A	Apr-89	490
Largemouth bass	5			Red	5A	Apr-89	141
Largemouth bass	5			Red	5A	Jun-89	162
Largemouth bass	5			Red	5A	Nov-89	191
Largemouth bass	5A	Mar-88	283	OR 04795	4A	Apr-89	336
Largemouth bass	5A	Apr-89	372	OR 09878	5A	May-89	382
Largemouth bass	5A	May-89	351	OR 10182	5A	Jun-89	344
Largemouth bass	5A	May-85	315	YL 02078	5A	Mav-89	406
Largemouth bass	8	Dec-88	369	YL 07305	4A	Apr-89	378
Largemouth bass	8C	May-89	473	YL 13838	10	Jul-89	464
Largemouth bass	9	Jul-89	286	YL 19105	9	Oct-89	310
Largemouth bass	9A	Apr-88	209	YL 07080	9A	May-89	237
Largemouth bass	11	Aug-89	210	YL 19153	6A	Oct-89	235
Largescale sucker	1			Blue	1	Mar-89	368
Largescale sucker	1			Blue	1	Apr-89	400
Largescale sucker	1			Blue	1	Apr-89	369
Largescale sucker	1			Blue	1	Apr-89	428
Largescale sucker	1			Blue	1	Apr-89	402
Largescale sucker	1			Blue	2	Apr-89	396
Largescale sucker	1			Blue	2	Apr-89	432
Largescale sucker	1			Blue	1	May-89	454
Largescale sucker	1			Blue	1	Jul-89	376
Largescale sucker	1			Blue	1	Sep-89	422
Largescale sucker	2			Salmon	2	Nov-88	475
Largescale sucker	2			Salmon	2	Nov-88	488
Largescale sucker	2			Salmon	2	Nov-88	434
Largescale sucker	2			Salmon	2	Mar-89	469
Largescale sucker	2			Salmon	2	Mar-89	482
Largescale sucker	2			Salmon	2	Mar-89	488
Largescale sucker	2			Salmon	2	Apr-89	440
Largescale sucker	2			Salmon	2	Apr-89	466
Largescale sucker	2			Salmon	2	Apr-89	420
Largescale sucker	2			Salmon	2	Apr-89	490
Largescale sucker	2			Salmon	2	Apr-89	410
Largescale sucker	2			Salmon	2	May-89	448

Table **3.101.** (cont.)

SPECIES	LOCATION TAGGED	DATE TAGGED	LENGTH AT TAGGING (mm)	TAG #/COLOR	LOCATION RECAPTURED	DATE RECAPTURED	LENGTH AT RECAPTURE (mm)
Largescale sucker	2			Salmon	2	Jun-89	408
Largescale sucker	3			Yellow	3	Jun-89	492
Largescale sucker	3			Yellow	2	Jul-89	493
Largescale sucker	3			Yellow	3A	Aug-89	526
Largescale sucker	3			Yellow	4	Nov-88	392
Largescale sucker	3A	Aug-89	535	OR 10339	3A	Sep-89	537
Largescale sucker	4			Lavender	5	Aug-89	485
Largescale sucker	5			Red	5	Jan-89	505
Largescale sucker	5			Red	5	Jan-89	497
Largescale sucker	5			Red	6A	May-89	201
Largescale sucker	6A	Apr-89	533	OR 10036	7	Jun-89	540
Largescale sucker	9	Jul-89	521	OR 19107	9	Dec-89	520
Largescale sucker	9	May-89	503	YL 13723	9	Jun-89	519
Largescale sucker	11			Orange	11	Apr-89	491
Largescale sucker	11			Orange	11	Apr-89	494
Largescale sucker	11			Orange	11	Jun-89	481
Largescale sucker	11			Orange	11	Nov-89	478
Largescale sucker	11	Apr-88	505	YL 06875	11	Apr-89	506
Longnose sucker	3			Yellow	3A	Nov-88	465
Longnose sucker	3			Yellow	3A	Jun-89	470
Longnose sucker	3			Yellow	3A	Jul-89	362
Longnose sucker	3			Yellow	3A	Aug-89	406
Longnose sucker	3			Yellow	3A	Aug-89	415
Longnose sucker	3			Yellow	3A	Aug-89	417
Longnose sucker	3			Yellow	3A	Aug-89	430
Longnose sucker	3			Yellow	3A	Nov-89	380
Longnose sucker	4			Lavender	3A	Aug-89	387
Longnose sucker	4			Lavender	4A	Jun-89	321
Longnose sucker	6			Clear	3	Jan-89	412
Longnose sucker	6			Clear	6A	Apr-89	370
Longnose sucker	6			Clear	5	Sep-89	434
Longnose sucker	6			Clear	5A	Dec-89	425
Mountain whitefish	2	May-89	275	YL 13794	2	Jul-89	273
Mountain whitefish	2	Apr-88	235	YL 06809	2	Jul-89	239
Mountain whitefish	2	Apr-88	253	YL 06830	2	Jul-89	271
Mountain whitefish	2	Apr-88	274	YL 06929	2	May-89	270
Mountain whitefish	2	Jun-89	270	YL 07820	2	Jul-89	264
Mountain whitefish	2	Jul-88	232	YL 08176	2	Jun-89	247
Mountain whitefish	2	May-88	233	YL 08712	2D	Jul-89	324
Mountain whitefish	2	May-88	287	YL 13031	2	Jan-89	285
Mountain whitefish	2	May-88	230	YL 13034	2	Jun-89	232
Mountain whitefish	2	Apr-89	206	YL 13629	2	Jul-89	224
Mountain whitefish	2	May-89	246	YL 13702	2	Jul-89	250
Mountain whitefish	2	Mar-89	258	YL 19004	2	Apr-89	260
Mountain whitefish	3A	Mar-88	293	OR 04980	5	Nov-88	293
Mountain whitefish	3A	Mar-88	349	OR 04989	3A	Jul-89	349
Mountain whitefish	3A	Mar-88	268	OR 04992	3A	Oct-89	283
Mountain whitefish	3A	Aug-88	323	OR 09582	3A	Aug-89	334
Mountain whitefish	3A	Aug-88	328	OR 09589	3A	Aug-89	340
Mountain whitefish	3A	Aug-88	328	OR 09589	3A	Sep-89	342
Mountain whitefish	3A	Aug-88	271	OR 09631	3A	Jul-89	282
Mountain whitefish	3A	Aug-88	324	OR 09633	3A	Jul-89	234
Mountain whitefish	3A	Aug-88	324	OR 09636	3A	Sep-89	319
Mountain whitefish	3A	Sep-88	280	OR 09651	3A	Oct-89	287
Mountain whitefish	3A	Sep-88	330	OR 09658	2	Jul-89	342
Mountain whitefish	3A	Sep-88	320	OR 09672	3A	Aug-89	345
Mountain whitefish	3A	Sep-88	283	OR 09673	3A	Aug-89	286
Mountain whitefish	3A	Sep-88	302	OR 09688	3A	Oct-89	305
Mountain whitefish	3A	Sep-88	305	OR 09688	3A	Oct-89	315
Mountain whitefish	3A	Sep-88	285	OR 09691	3A	Aug-89	295
Mountain whitefish	3A	Sep-88	285	OR 09691	3A	Oct-89	296
Mountain whitefish	3A	Sep-88	278	OR 09693	3A	Aug-89	282
Mountain whitefish	3A	Sep-88	306	OR 10127	3A	Sep-89	319
Mountain whitefish	3A	Sep-88	287	OR 10131	3A	Jul-89	298
Mountain whitefish	3A	Sep-88	302	OR 10144	3A	Aug-89	315
Mountain whitefish	3A	Aug-88	236	OR 10211	3A	Aug-89	297

Table **3.101.** (cont.)

SPECIES	LOCATION TAGGED	DATE TAGGED	LENGTH AT TAGGING (mm)	TAG #/COLOR	LOCATION RECAPTURED	DATE RECAPTURED	LENGTH AT RECAPTURE (mm)
Mountain whitefish	4	Jan-89	291	OR 09382	2	Jul-89	290
Mountain whitefish	6	Mar-89	283	OR 09469	6	Dec-89	287
Mountain whitefish	6	Dec-88	244	OR 09487	6	May-89	253
Mountain whitefish	8A	Aug-88	284	YL 08029		Jun-89	296
Mountain whitefish	9	Mar-88	258	YL 06757	9	Mar-89	265
Mountain whitefish	10	Dec-88	263	YL 07373	10	Dec-89	257
Mountain whitefish	10	Nov-88	205	YL 07381	10	Jan-89	209
Mountain whitefish	10	Nov-88	247	YL 07386	10	Apr-89	250
Mountain whitefish	10	Jan-89	239	YL 08934	10	May-89	245
Mountain whitefish	11			Orange	11	Dec-89	215
Mountain whitefish	11	Sep-88	285	YL 07890	11	Mar-89	304
Mountain whitefish	11	Sep-88	310	YL 07892	2	Mar-89	303
Mountain whitefish	11	Jan-89	298	YL 08787	11	Apr-89	301
Mountain whitefish	11	Sep-88	210	YL 12575	11	Jun-89	226
Mountain whitefish	11	Apr-89	257	YL 13696	11	May-89	255
Mountain whitefish	11	Apr-89	264	YL 13700	11	May-89	270
Mountain whitefish	11	May-89	255	YL 13821	11	Aug-89	254
Mountain whitefish	11	Nov-89	286	YL 32010	11	Dec-89	286
Mountain whitefish	11	Nov-89	233	YL 32014	11	Dec-89	231
Northern squawfish	1			Blue	1	Apr-89	265
Northern squawfish	1			Blue	1	Jun-89	202
Northern squawfish	1			Blue	1	Jun-89	210
Northern squawfish	1			Blue	1	Jun-89	220
Northern squawfish	1			Blue	1	Jun-89	240
Northern squawfish	1			Blue	2	Jul-89	223
Northern squawfish	1			Blue	1	Sep-89	220
Northern squawfish	2			Salmon	2	May-89	390
Northern squawfish	2			Salmon	2	Nov-89	271
Northern squawfish	3			Yellow	3A	Nov-89	286
Northern squawfish	4			Lavender	4A	Oct-89	291
Northern squawfish	9			Lt blue	8	May-89	232
Northern squawfish	10			Lt blue	10	Dec-88	244
Northern squawfish	10			Orange	10	Nov-89	250
Northern squawfish	10			Orange	10	Nov-89	270
Northern squawfish	11			Orange	11	Jun-89	226
Pumpkinseed	4			Lavender	4	Dec-88	108
Pumpkinseed	5			Red	5A	Jun-89	116
Pumpkinseed	7			Brown	7	Apr-89	120
Rainbow trout	5			Orange	3A	Aug-89	300
Tench	3			Yellow	3A	Jun-89	309
Tench	3A	Sep-88	346	OR 09668	3A	Aug-89	350
Tench	4			Lavender	4A	Nov-88	230
Tench	4			Lavender	4A	Jun-89	270
Tench	5			Red	5	Jul-89	436
Tench	5			Red	5A	Nov-88	212
Tench	5			Red	5A	Aug-89	241
Tench	10			Orange	10	Nov-89	252
Yellow perch	1			Blue	1	Dec-88	152
Yellow perch	1			Blue	1	Dec-89	190
Yellow perch	2			Salmon	2	Nov-88	142
Yellow perch	2			Salmon	2	Nov-88	150
Yellow perch	2			Salmon	2	Nov-88	181
Yellow perch	3A	Sep-88	178	OR 09684	3A	Dec-89	185
Yellow perch	4			Lavender	4A	Dec-88	158
Yellow perch	4			Lavender	4A	Apr-89	155
Yellow perch	4			Lavender	3A	Jul-89	174
Yellow perch	4			Lavender	4A	Jul-89	161
Yellow perch	5			Orange	5	Aug-89	144
Yellow perch	5			Red	5	Dec-88	167
Yellow perch	5			Red	5	Jun-89	156
Yellow perch	5			Red	5	Jul-89	145
Yellow perch	5			Red	5A	Jun-89	141
Yellow perch	5			Red	5A	Jun-89	145
Yellow perch	5			Red	5A	Jun-89	153
Yellow perch	5			Red	5A	Jun-89	153
Yellow perch	5			Red	5A	Sep-89	139

Table **3.101.** (cont.)

SPECIES	LOCATION TAGGED	DATE TAGGED	LENGTH AT TAGGING (mm)	TAG #/COLOR	LOCATION RECAPTURED	DATE RECAPTURED	LENGTH AT RECAPTURE (mm)
Yellow perch	7			Brown	7	Nov-88	146
Yellow perch	7			Brown	7	Nov-88	175
Yellow perch	7			Brown	5A	May-89	172
Yellow perch	8			Green	8	Nov-88	143
Yellow perch	8			Green	6	Jun-89	152
Yellow perch	8			Green	8	Sep-89	166
Yellow perch	8			Green	8	Oct-89	174
Yellow perch	9			Lt blue	4A	Apr-89	166
Yellow perch	9			Lt blue	9	Jun-89	144
Yellow perch	10			orange	10	Jul-89	145

Table **3.102.** Tagging and recapture information on tagged fish caught by anglers. The location **BT-2B** indicates the fish was captured at an unknown location during a bass tournament and was released at site **2B.**

SPECIES	LOCATION TAGGED	DATE TAGGED	LENGTH AT TAGGING (mm)	TAG #/COLOR	LOCATION RECAPTURED	DATE RECAPTURED	LENGTH AT RECAPTURE (mm)
Black crappie	4A	May-88	232	OR 05151	5 mi. S. of Ione	Oct-89	239
Brown trout	8A	Oct-88	624	Y YL 07410	2	Apr-89	
Largemouth bass	4A	May-85	487	OR 01369	3A	May-88	483
Largemouth bass	5A	May-85	340	YL 02077	Usk/Cusick	Apr-89	381
Largemouth bass	5A	May-85	330	YL 02058	5B	?	330
Largemouth bass	9A	May-89	445	YL 13724	9A	Jun-89	457
Largemouth bass	BT-2B	Jun-89	368	BR 21802	Campbell slough	Jun-89	381
Largemouth bass	BT-2B	May-89	370	YL 18168	near Cusick	May-89	419
Largemouth bass	BT-2B	Jun-89	406	BR 21545	BT-2B	Jun-89	408
Largemouth bass	BT-2B	Jun-89	345	BR 21572	BT-2B	Jun-89	350
Largemouth bass	BT-2B	May-89	398	YL 18001	BT-2B	Jun-89	403
Largemouth bass	BT-2B	May-89	373	YL 18013	BT-2B	Jun-89	310
Largemouth bass	BT-2B	May-89	369	YL 18026	BT-2B	Jun-89	375
Largemouth bass	BT-2B	May-89	382	YL 18027	BT-2B	Jun-89	378
Largemouth bass	BT-2B	May-89	308	YL 18061	BT-2B	Jun-89	310
Largemouth bass	BT-2B	May-89	364	YL 18069	BT-2B	Jun-89	364
Largemouth bass	BT-2B	May-89	320	YL 18082	BT-2B	Jun-89	319
Largemouth bass	BT-2B	May-89	312	YL 18098	BT-2B	Jun-89	314
Largemouth bass	BT-2B	May-89	316	YL 18099	BT-2B	Jun-89	315
Largemouth bass	BT-2B	May-89	364	YL 18161	BT-2B	Jun-89	359
Largemouth bass	BT-2B	May-89	352	YL 18378	BT-2B	Jun-89	355
Largemouth bass	BT-2B	May-89	434	YL 18379	BT-2B	Jun-89	444
Largemouth bass	BT-2B	May-89	332	YL 18393	BT-2B	Jun-89	332
Largemouth bass	BT-2B	May-89	352	YL 18409	BT-2B	Jun-89	352
Largemouth bass	BT-2B	May-89	370	YL 18412	BT-2B	Jun-89	372
Largemouth bass	BT-2B	May-89	368	YL 18413	BT-2B	Jun-89	374
Largemouth bass	BT-2B	May-89	363	YL 18415	BT-2B	Jun-89	365
Largemouth bass	BT-2B	May-89	363	YL 18415	BT-2B	Jun-89	365
Largemouth bass	BT-2B	May-89	315	YL 18417	BT-2B	Jun-89	318
Largemouth bass	BT-2B	May-89	322	YL 18435	BT-2B	Jun-89	318
Largemouth bass	BT-2B	May-89	332	YL 18449	BT-2B	Jun-89	333
Largemouth bass	BT-2B	May-89	420	YL 18491	BT-2B	Jun-89	425
Largemouth bass	BT-9A	Aug-88	351	YL 12532	BT-2B	May-89	361
Largemouth bass	BT-9A	Aug-88	324	YL 12536	BT-2B	Jun-89	323
Largemouth bass	1B	May-88	367	YL 08020	BT-2B	Jun-89	372
Largemouth bass	2	Aug-88	350	YL 07465	BT-2B	Jun-89	363
Largemouth bass	3	Apr-89	415	OR 04902	BT-2B	May-89	368
Largemouth bass	3C	May-88	265	OR 05219	BT-2B	Jun-89	319
Largemouth bass	3C	May-88	375	OR 10888	BT-2B	May-89	388
Largemouth bass	4A	May-88	405	OR 05171	BT-2B	May-89	423
Largemouth bass	4A	Apr-88	292	OR 05287	BT-2B	May-89	364
Largemouth bass	4A	Apr-88	308	OR 09912	BT-2B	May-89	319
Largemouth bass	4A	Apr-89	346	OR 10015	BT-2B	Jun-89	345
Largemouth bass	4A	Apr-89	385	OR 10016	BT-2B	May-89	375
Largemouth bass	4A	May-86	415	YL 01010	BT-2B	Jun-89	475
Largemouth bass	4B	May-88	288	OR 05197	BT-2B	Jun-89	333
Largemouth bass	4B	Apr-89	314	OR 09895	BT-2B	Jun-89	325
Largemouth bass	5A	Jun-88	280	OR 09420	BT-2B	May-89	305
Largemouth bass	5A	Apr-89	415	OR 09890	BT-2B	Jun-89	409
Largemouth bass	11	Jun-88	426	YL 13130	BT-2B	May-89	458
Largemouth bass	11	Sep-88	300	YL 07879	BT-2B	Jun-89	295
Mountain whitefish	11	Sep-88	258	YL 07889	2.5 mi. N. of Usk	Apr-89	381

Table **3.103.** Tagging and recapture information on tagged fish caught during fisheries surveys conducted by the University of Idaho.

SPECIES	LOCATION TAGGED	DATE TAGGED	LENGTH AT TAGGING (mm)	TAG #/COLOR	LOCATION RECAPTURED	DATE RECAPTURED	LENGTH AT RECAPTURE (mm)
Brown trout	3A	Sep-89	557	OR 09204	8A	Oct-89	429
Brown trout	3A	Aug-89	605	OR 10338	8A	Oct-89	605
Brown trout	8A	Aug-89	600	YL 19131	8A	Oct-89	600
Largemouth bass	BT-2B	May-89	420	YL 18005	3	Jul-89	415
Largemouth bass	BT-2B	Jun-89	421	BR 21680	3	Jul-89	434
Largemouth bass	2B	Jun-89	185	YL 07852	4	Jul-89	189
Largemouth bass	BT-2B	Jun-89	421	BR 21680	4	Jul-89	483
Largemouth bass	5A	Apr-89	372	OR 09878	4	Jul-89	377
Largemouth bass	8			Green	10	Jul-89	225
Largemouth bass	8			Lt blue	8	Jul-89	172
Largemouth bass	4			Lavender	4	Jul-89	190
Largescale sucker	3	Jun-89	540	YL 12229	3	Jul-89	523
Mountain whitefish	3A	Sep-88	329	OR 09672	4	Oct-89	345

mm/year, as 5+. Largemouth bass growth ranged from no growth, for 13 and 14 year old fish, to 90 mm/year, for 3+. Mountain whitefish grew from 9 mm/year, as 4+, to 30 mm/year, as 2+.

3.8 CREEL SURVEY

3.8.1 ANGLER PRESSURE, CATCH PER UNIT EFFORT (CPUE), TOTAL CATCH, AND HARVEST ESTIMATE

The pressure estimate for boat anglers was 1,889 ± 229 angler hours (Table 3.105). The shore angler pressure estimate was 1140 ± 145 angler hours. The total pressure estimate for Box Canyon Reservoir was 3,029 ± 374 angler hours in 1989.

Annual estimates for catch per unit effort (CPUE), total catch ± 95% confidence interval (C.I.) and harvest ± 95% C.I. are found in Table 3.106. The CPUE for boat anglers (kept and released fish) was 5.49 fish/hour. Shore angler CPUE was 6.84 fish/hour and the CPUE for all anglers was 5.89 fish/hour. Total catch for boat anglers was 10,364 ± 1288 fish. Largemouth bass made up the largest proportion of the boat anglers catch (9231 ± 1148), followed by black crappie (491 ± 61), northern squawfish (302 ± 37), and bull trout (170 ± 21). The shore angler total catch was 7,807 ± 960 fish. Yellow perch made up the largest proportion of the shore angler catch (6,007 ± 740 fish), followed by pumpkinseed (718 ± 88), northern squawfish (524 ± 64), and black crappie (228 ± 28). The total catch for the Pend Oreille River in 1989 was 18,171 ± 2,248 fish.

Harvest estimates were calculated based on kept fish checked during angler interviews. The CPUE for harvested fish by boat anglers was 0.16 fish/hour (Table 3.106). The CPUE for shore anglers was 0.94 fish/hour. Total harvest for all anglers was 1,331 ± 164 fish. Yellow perch made up the largest proportion of the total harvest (684 ± 84), followed by pumpkinseed (182 ± 22), bull trout (181 ± 23), and largemouth bass (103 ± 12). Harvest estimates for boat anglers was 284 ± 35 fish. Bull trout made up the largest proportion of the boat angler harvest (170 ± 21) followed by brown trout (57 ± 7) and largemouth bass (57 ± 7). Shore angler harvest was 1,047 ± 129 fish, which was made up of 684 ± 84 yellow perch, 182 ± 22 pumpkinseed, 102 ± 12 northern squawfish, and 46 ± 5 largemouth bass.

Table **3.104.** Growth increments of tagged fish based upon the difference in length at tagging and recapture.

	N	AGE AT TAGGING	MEAN MONTHLY GROWTH INCR. (mm.)	MEAN ANNUAL GROWTH INCR. (mm)
Brown trout	1	2+	0.60	7.20
	1	3+	1.54	18.48
	1	4+	0.0	0.0
	1	5+	5.38	64.56
	4	6+	2.13	25.62
	5	7+	3.06	36.67
	6	≥8+	2.06	24.67
Largemouth Bass	4	3+	7.46	89.54
	2	4+	7.33	87.92
	5	5+	4.98	59.72
	13	6+	2.93	35.13
	14	7+	1.27	15.18
	12	8+	1.32	15.18
	10	9+	2.46	29.46
	5	10+	3.07	36.84
	9	11+	4.02	48.20
	2	12+	6.0	72.0
	1	13+	0.0	0.0
	2	14+	0.0	0.0
Mountain Whitefish	10	2+	2.46	29.57
	16	3+	1.02	12.29
	27	4+	0.76	9.08

Table 3.105 Pressure estimate ± confidence intervals for shore and boat anglers for each strata on the Pend Oreille River, WA (January-December, 1989).

LOCATION	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug	Sep	Oct.	Nov.	Dec.	Total
SECTION 1													
Weekdays (boats)	0		9±2	30±3	191±17	60±6	0	35±4	0	0	0	-	325±32
Weekdays (shore)	0		0	100±7	56±12	8±2	29±3	23±3	18±2	11±2	0	-	245±31
Weekends (boat)	11±1		12±3	73±8	161±17	-	55±5	0	0	15±4	0	-	327±38
Weekends (shore)	28±2		90±18	236±18	7±2	-	63±6	8±2	0	0	0	-	432±48
SECTION 2													
Weekdays (boats)				68±7	178±9	60±6	19±2	23±3	31±4	0	0	-	379±31
Weekdays (shore)				22±4	0	20±2	0	23±2	0	25±4	7±1	-	97±13
Weekends (boat)				75±10	23±4	154±19	18±3	25±4	71±10	15±5	10±2	-	391±57
Weekends (shore)				28±5	0	21±3	42±8	43±8	16±4	0	5±1	-	155±29
SECTION 3													
Weekdays (boats)				5±1	0	0	96±11	92±6	55±9	22±4	0	-	270±31
Weekdays (shore)				5±1	0	0	63±6	120±11	0	0	0	-	188±18
Weekends (boat)				0	0	12±3	15±3	71±11	68±15	23±6	8±2	-	197±40
Weekends (shore)				6±2	13±2	0	0	0	0	4±2	0	-	23±6
TOTAL PRESSURE													
Boat anglers	11±1	0	21±5	251±29	553±47	286±34	203±24	246±28	225±38	75±19	18±4	-	1889±229
Shore anglers	28±2	0	90±18	397±37	76±16	49±7	197±23	217±26	34±6	40±8	12±2	-	1140±145
All anglers	39±3	0	111±23	648±66	629±63	335±41	400±47	463±54	259±44	115±27	30±6	-	3029±374

Table **3.106.** Annual estimates for catch ± **95% C.I.** (including fish released), harvest ± **95% C.I.,** and **(CPUE)** for the **Pend Oreille** River **(January-**December, **1989).**

	TOTAL CATCH			HARVEST		
	BOAT ANGLERS	SHORE ANGLERS	TOTAL	BOAT ANGLERS	SHORE ANGLERS	TOTAL
Catch Rate (CPUE) (Fish/Hour)	5.49	6.84	5.89	0.16	0.94	0.41
Largemouth Bass	(4.89) 9231±1148	(0.15) 171±21	(3.33) 9402±1169	(0.03) 57±7	(0.04) 46±5	(0.03) 103±12
Yellow Perch	(0.06) 113±14	(5.27) 6007±740	(1.73) 6120±754		(0.6) 684±84	(0.19) 684±84
Black Crappie	(0.26) 491±61	(0.2) 228±28	(0.24) 719±89			
Brown Trout	(0.03) 57±7	(0.03) 34±4	(0.03) 91±11	(0.03) 57±7	(0.01) 11±2	(0.02) 68±9
Bull Trout	(0.09) 170±21	(0.01) 11±2	(0.07) 181±23	(0.09) 170±21	(0.01) 11±2	(0.07) 181±23
Mountain Whitefish		(0.03) 34±4	(0.008) 34±4		(0.01) 11±2	(0.004) 11±2
Peamouth		(0.04) 46±5	(0.01) 46±5			
Pumpkinseed		(0.63) 718±88	(0.2) 718±88		(0.16) 182±22	(0.05) 182±22
Northern Squawfish	(0.16) 302±37	(0.46) 524±64	(0.25) 826±101		(0.09) 102±12	(0.03) 102±12
Tench		(0.03) 34±4	(0.008) 34±4			
TOTAL	10,364±1288	7807±960	18,171±2248	284±35	1047±129	1331±164

The CPUE's for anglers targeting particular species of fish can be found in Table 3.107. Boat anglers fishing for largemouth bass had the highest CPUE (kept and released) at 5.58 fish/hour, followed by mountain whitefish anglers (5.3 fish/hour) and trout (0.26 fish/hour). Shore anglers fishing for largemouth bass caught 0.51 fish/hour and those fishing for trout caught 0.15 fish/hour. Boat anglers fishing for mountain whitefish had the highest CPUE for kept fish at 5.3 fish/hour, followed by trout anglers (0.1 fish/hour) and largemouth bass anglers (0.04). Table G.1 in Appendix G summarizes monthly creel census angler counts and CPUE.

3.8.2 ANGLER PREFERENCE

Boat and shore angler preferences for each species of fish are found in Table 3.108. During March, one shore angler and six boat anglers were interviewed. Of these, 100% of shore anglers and 33% of boat anglers had no preference. Sixty-six percent of the boat anglers interviewed preferred trout. In April, 29 shore anglers were interviewed. No preference was specified by 13.8% of these anglers, 55.2% preferred trout, 27.8% preferred largemouth bass and 3.4% were angling for black crappie. Two boat anglers were interviewed in April with both having a preference for largemouth bass. Three shore anglers and fifteen boat anglers were interviewed in May. Shore anglers preferred largemouth bass (66.7%) and trout (33.3%). All boat anglers interviewed preferred to catch largemouth bass. During June, 9 shore anglers were interviewed and 77.8% had no preference, followed by largemouth bass (11 .1%) and trout (11 .1%). Eleven boat anglers were interviewed in June. They preferred largemouth bass (90.9%) and trout (9.1%). In July, 18 shore anglers and 7 boat anglers were interviewed. The majority of shore anglers had no preference (50.0%). Boat anglers preferred trout (57.1%). Sixteen shore anglers and four boat anglers were interviewed in August. For shore anglers, 68.7% had no preference. Boat anglers preferred largemouth bass (50.0%) and trout (50.0%). During September, 11 shore anglers and 5 boat anglers were interviewed. Ninety percent of the shore anglers had no preference and 9.1% were fishing for trout. For boat anglers, 40 percent preferred largemouth bass, 40 percent were fishing for trout, and 20% were fishing for mountain whitefish. During October and November the majority of the shore anglers interviewed had no preference, 80.0% in October and 50.0% in November. Boat anglers during October and November preferred trout or had no preference. No angler contacts were made

Table **3.107. CPUE** for anglers fishing for specific species of fish, based on creel survey data taken from January - December, **1989.**

TARGET SPECIES	Kept and Released Fish: BOAT ANGLERS	Kept and Released Fish: SHORE ANGLERS	Kept and Released Fish: TOTAL	Kept Fish: BOAT ANGLERS	Kept Fish: SHORE ANGLERS	Kept Fish: TOTAL
Largemouth	5.58	0.51	5.24	0.04	- -	0.03
Trout	0.26	0.15	0.22	0.1	0.05	0.08
Mountain Whitefish	5.3	- -	5.3	5.3	- -	5.3
Black crappie	- -	- -	- -	- -	- -	- -

Table **3.108.** Angler preference for fish species in **Pend Oreille** River (January-December, **1989).**

	January	February	March	April	May	June	July	August	September	October	November	December
SHORE ANGLERS	NONE	NONE	N=1	N=29	N=3	N=9	N=18	N=16	N=11	N=5	N=2	NONE
No Preference			100	13.8		77.8	50.0	68.7	90.9	80.0	50.0	
Largemouth bass				27.6	66.7	11.1	11.1	6.3				
Trout				55.2	33.3	11.1	38.9	12.5	9.1	20.0	50.0	
Mountain Whitefish												
Yellow Perch												
Black Crappie				3.4				12.5				
Brown Bullhead												
BOAT ANGLERS	NONE	NONE	N=6	N=2	N=15	N=11	N=7	N=4	N=5	N=1	N=2	NONE
No Preference			33.3								100	
Largemouth bass				100	100	90.9	28.6	50.0	40.0			
Trout			66.7			9.1	57.1	50.0	40.0	100.0		
Mountain Whitefish							14.3		20.0			
Yellow Perch												
Black Crappie												
Brown Bullhead												

during January, February, and December surveys because few anglers were fishing the river in those months.

3.8.3 BASS TOURNAMENT RESULTS

Results of bass tournament angling success on the Pend Oreille River, from 1984 to 1989 (WDW files, UCUT files), are found in Table 3.109. Catch rate (CPUE) for weighed-in fish for tournaments during 1989 ranged from 0.174 fish/hour to 0.425 fish/hour. Mean weight for weighed-in fish declined from 3.2 lbs in 1988, to 1.5 lbs in 1989.

Table **3.109** Summary of bass tournament results.

Date	Angler hours	CPUE (kept-released fish/hour)	CPUE (kept-weighed in fish/hour)	Mean weight (lbs)	Weight range (lbs)
6/23-6/24/84	- -	- -	- -	1.6	- -
6/15-6/16/85	380	- -	0.189	1.8	0.8-4.6
5/17-5/18/86	- -	- -	0.154	1.8	- -
5/14-5/15/88	828	0.283	0.221	1.9	1.0-5.9
8/27/88	144	0.201	0.160	3.2	1.2-6.7
5/13-5/14/89	984	- -	0.364	1.9	- -
5/20-5/21/89	120	2.192	0.425	1.5	- -
6/24-6/25/89	288	- -	0.174	1.7	- -

DISCUSSION

The first year of this study (1988) was atypical in that it had abnormally low flows. In addition, a mechanical malfunction at Box Canyon Dam resulted in a drop in the water level in excess of 20 feet at lone, and 6 to 8 feet at Cusick, from May 19 to June 2. Fortunately, 1989 was much closer to an average year with respect to flow and reservoir elevations.

4.1 RELATIVE ABUNDANCE

The relative abundance did not change appreciably from 1988 to 1989 (Table 4.1). The relative abundance of yellow perch and largemouth bass increased slightly while the relative abundance of pumpkinseed and tench decreased slightly. The total number of fish caught decreased over 1988 even though the electrofishing effort was increased by more than 36 hours. The CPUE was 6.12 fish/min of electrofishing in 1988, and 3.23 fish/min of electrofishing in 1989. The higher water levels in 1989 helps to account for the reduced catch-per-unit-effort (CPUE). Generally, in months with high water levels fewer fish were caught than in months with low water levels. The lower CPUE may also be attributed to lower population levels in 1989.

4.2 POPULATION ESTIMATES

4.2.1 RIVER AND SLOUGHS

The minimum number of recaptures required to estimate a population using a multiple census method is four (Ricker 1975). This was not met for longnose sucker, with three recaptures, brown bullhead, with one recapture, brown trout in site 3A, with three recaptures, and brown trout in site 8A with two recaptures. Recruitment and mortality should be “approximately” zero during the period of the estimate (Ricker 1975). Mortality was not determined and the degree it influenced the estimates is unknown. Recruitment of young-of-the-year fish was eliminated by estimating the population for one year and older fish. There was no movement of tagged fish between sites during the estimate, However, only larger individuals of a target species were given a numbered Floy tag, all other fish were fin clipped, so movement could not be determined.

Table **4.1.** Comparison of total numbers of fish (and relative abundance) of fish captured by **electrofishing** in **1988** (Barber et ***al.*** **1989)** and **1989.**

Year Shock time (min)	1988 3,256	1989 5 432
Yellow perch	8,390 (42.1)	7,917 (45.1)
Pumpkinseed	3,791 (19.0)	2,897 (16.5)
Tench	1,920 (9.6)	1,465 (8.3)
Largemouth bass	1,434 (7.2)	1,589 (9.1)
Northern squawfish	1,057 (5.3)	620 (3.5)
Largescale sucker	949 (4.8)	789 (4.5)
Mountain whitefish	860 (4.3)	1,054 (6.0)
Longnose sucker	723 (3.6)	530 (3.0)
Brown bullhead	268 (1.3)	219 (1.2)
Black crappie	262 (1.3)	233 (1.3)
Peamouth	127 (0.6)	62 (0.4)
Brown trout	114 (0.6)	117 (0.7)
Cutthroat trout	11 (0.05)	15 (0.1)
Redside shiner	11 (0.05)	2 (0.01)
Rainbow trout	6 (0.03)	13 (0.01)
Sculpin	6 (0.03)	11 (0.1)
Brook trout	1 (0.01)	2 (0.01)
Bull trout	1 (0.01)	2 (0.01)
Kokanee		12 (0.1)
Lake trout		2 (0.01)
TOTAL	19,931	17,554

All estimates, except largemouth bass and mountain whitefish, decreased sharply from 1988 to 1989 (Table 4.2). The yellow perch estimate was 41.8 million, in 1988, compared to 6.1 million, in 1989. The pumpkinseed estimate went from 16.8 million in 1988, to 3.9 million in 1989, and the tench population dropped from 4.2 million to 1 .1 million. There was no overlap in the 95 percent confidence intervals of the estimates for either species, leading to the conclusion that differences in the estimates are either real or there was a problem with how the estimates were conducted.

-The 1989 estimates are believed to be more reliable than the 1988 estimates for the following reasons: (1) the Floy tagging technique used in 1988 probably resulted in mortality, or tag loss for at least yellow perch and pumpkinseed, whereas fin clips used to mark fish in 1989 probably resulted in lower mortality; and (2) there were more yellow perch and pumpkinseed recaptures in 1989 over 1988, resulting in much narrower confidence intervals.

To help evaluate the estimates, the percent composition from the population estimates was compared with the electrofishing relative abundance (Table 4.3). In 1988, yellow perch were much more abundant in the population data than in the relative abundance data (Table 4.3). This suggests that the yellow perch estimates were high in 1988. The percent composition of pumpkinseed was higher in the population estimates than in the relative abundance, indicating that either they were overestimated in the population estimates or underrepresented in the relative abundance. All other species were comparable between the population estimates and the relative abundance.

Evidence that populations of certain species of fish were overestimated in 1988 includes possible differential mortality owing to size. Captured fish were given a Floy FD-67F anchor tag with the paddle removed. Yellow perch and pumpkinseeds down to 100 mm were tagged. This may have resulted in a high mortality or at least a poor tag retention since the anchor was positioned near the surface. The largemouth bass and mountain whitefish estimates would not be influenced by this problem since largemouth bass were not tagged until they were about 140 mm, making the tagging less likely to cause mortality and allowing the tag to be positioned properly, reducing the chance of loss. The largemouth bass population estimate was 590,906 in 1989 compared to 657,549 in 1988. The mountain whitefish population estimate was 163,890 in

Table **4.2.** Comparison of river population estimates and **95%** confidence limits from **1989** with those of Barber et *al.* **(1989)** from **1988.**

	1988			1989		
	Estimate	Lower limit	Upper limit	Estimate	Lower limit	Upper limit
Yellow perch	41,777,446	23,872,826	80,859,573	6,101,448	4,139,850	9,116,972
Pumpkinseed	16,822,372	7,704,903	45,879,573	3,889,758	1,969,498	9,152,371
Tench	4,282,807	2,081,920	10,707,019	1,085,921	497,368	2,961,603
Largescale sucker	821,863	432,560	1,849,192	186,693	79,783	583,416
Longnose sucker	781,166	357,786	2,130,452	183,457	62,542	917,286
Largemouth bass	657,549	455,727	989,859	590,906	299,193	1,390,366
Northern squawfish	580,565	359,271	1,009,679	248,988	97,642	995,950
Mountain whitefish	164,252	120,185	231,258	163,890	70,038	512,156

Table **4.3.** Comparison of the percent composition for each species from population estimates and **electrofishing** relative abundance for **1989** and **1988** (Barber et *al.* **1989).**

Species	Percent Composition from population estimates	Percent Composition from **electrofishing** relative abundance
1989		
Yellow perch	48.8	45.1
Pumpkinseed	31.1	16.5
Tench	8.7	8.3
Largemouth bass	4.7	9.1
Northern squawfish	2.0	3.5
Largescale sucker	1.5	4.5
Longnose sucker	1.5	3.0
Mountain whitefish	1.3	6.0
Brown bullhead	0.2	1.2
Brown trout	0.05	0.7
1988		
Yellow perch	62.9	42.1
Pumpkinseed	25.3	19.0
Tench	6.4	9.6
Largescale sucker	1.2	4.8
Longnose sucker	1.2	3.6
Largemouth bass	1.0	7.2
Northern squawfish	0.9	5.3
Black crappie	0.9	1.3
Mountain whitefish	0.2	4.3

1989, compared to 164,252 in 1988. Given the size of the sample area and the techniques available to estimate the population, these estimates are probably as close as can be expected.

Tench, sucker, and northern squawfish populations also declined in 1989. A very small portion of these species were under 200 mm when tagged. Given that there is some overlap in the 95 percent confidence intervals of the estimates for tench, both species of suckers, and northern squawfish between 1988 and 1989 (Table 4.2), the true populations could be within the confidence intervals for both years.

While the population estimates for yellow perch and pumpkinseed were probably overestimated in 1988, there is some evidence that there was a reduction in the populations in 1989. Largemouth bass and mountain whitefish population estimates decreased slightly from 1988 to 1989, however, their relative abundance increased (Table 4.1). The percent of 2+ and 3+ yellow perch in the age relative abundance respectively decreased from 9.2 and 24.1 percent in 1988 (Barber et *al.* 1989), to 1 .0 and 9.2 percent in 1989 (Table 3.4). This indicates that there may have been density independent mortality at work on the younger age classes of yellow perch. It was not possible to determine if there was a decrease in 0+ and 1+ numbers due to the low numbers captured each year. However, the fact that populations of nearly all species were reduced in 1989 indicates the possibility of a reservoir wide impact in 1988 that resulted in a density independent mortality of all species, causing population decline in 1989. The low flow and drawdown in 1988 could be factors that were partially responsible for density independent mortality since they impacted the entire reservoir.

Thus, we conclude that the population reductions observed between 1988 and 1989 are owing to a combination of two factors: (1) poorer reliability of estimates for perch and pumpkinseeds in 1988 **than 1989, which probably resulted in a population overestimate for** both species in 1988, and (2) density independent **mortality** of all species that occurred in 1988, resulting in **decreased populations in** 1989.

There was concern that bass populations may be negatively impacted by being harvested by anglers. In 1988, the estimated population for largemouth bass was 657,549 with confidence limits of 455,727 and 989,859 and estimated harvest was 389 ± 40 for a rate of 0.06% of the population harvested. In 1989, the population estimate was 590,906 with confidence limits of 299,193 and 1,390,366 and estimated harvest was 103 ± 12 for a rate of 0.02% of the population harvested. It appears overharvest was not a problem in either year. Most of the bass anglers on the Pend Oreille River practiced catch and release fishing. One concern is the scheduling of bass tournaments during the peak spawning season and taking the bass from their nests to a central location for a weigh-in. This probably reduces bass spawning success in a population that is most likely already limited by recruitment.

4.2.2 TRIBUTARIES

Three assumptions should be met for a removal depletion estimate: (1) no fish can move in or out of the sample area; (2) each fish has an equal chance of being captured; and (3) the probability of capture is constant over all removal occasions. These assumptions were met by: (1) placing block nets at the upstream and downstream ends of the study reach; (2) keeping the shocking time as close as possible on each pass: and (3) keeping the same crew for each pass to insure consistency in effort between passes.

Table 4.4 compares brown trout densities (fish/100 m^2) in the study tributaries and other streams in the region. Brown trout densities were highest in the downstream reaches of the study tributaries, Skookum, and Cee Cee Ah Creeks had the highest densities of brown trout of the study reaches. All of the study reaches which contained brown trout exceeded the densities found in literature for other streams in the region. Table 4.5 compares the densities (fish/100 m^2) of brook trout in the study tributaries and other streams in the region. Brook trout densities were generally higher in the upstream reaches of the study tributaries. The highest brook trout densities were found in Ruby and Skookum Creeks. The Pend Oreille River tributaries tended to have higher brook trout densities than did most of the other streams in the region for which densities were found in the literature.

The highest cutthroat trout density of all the study tributaries was found in Cee Cee Ah Creek (Table 4.6). The Pend Oreille River tributaries tended to have lower cutthroat trout densities than found in other streams in the region. These low densities are attributable to the high densities of brook trout in the tributaries.

Table 4.4. Comparison of brown trout densities (fish/100m²).

Location	Density	Reference
S. Fork Snake River, ID	0.4	(Luken 1988)
Willow Creek, ID	0.2	(Corsi and Elle 1989)
Henrys Fork, Snake River, ID	0.07	(Luken 1988)
Skookum Creek, WA		present study
Reach 1	2.8	
Reach 2	80.9	
Reach 3	3.0	
Cee Cee Ah Creek, WA		present study
Reach 1	25.7	
Reach 2	35.6	
Reach 3	4.1	
LeClerc Creek, WA		present study
Reach 1	6.0	
Reach 2	0.7	
Reach 3	1.5	
Ruby Creek, WA		present study
Reach 1	no estimate	

Table 4.5. Comparison of brook trout densities (fish/100m²).

Location	Density	Reference
Homer Creek, ID	31.3	(Corsi and Elle 1989)
N. Fork Grouse Creek, ID	7.7	(Hoelscher and Bjornn 1989)
S. Fork Grouse Creek, ID	0.3	(Hoelscher and Bjornn 1989)
Twin Creek, ID	4.8	(Hoelscher and Bjornn 1989)
E. Fork Hayden Creek, ID	2.1	(Gamblin 1987)
Copper Creek, ID	3.6	(Gamblin 1987)
Leiberg Creek, ID	0.1	(Gamblin 1987)
Tie Creek, ID	0.4	(Gamblin 1987)
Alder Creek, ID	0.6	(Gamblin 1987)
Skookum Creek, ID	0.5	(Gamblin 1987)
Skookum Creek, WA		present study
Reach 2	10.7	
Reach 3	11.0	
Reach 4	50.7	
Cee Cee Ah Creek, WA		present study
Reach 2	no estimate	
Reach 3	12.0	
Reach 4	34.0	
Tacoma Creek, WA		present study
Reach 1	21.8	
Reach 2	26.3	
Reach 3	20.7	
Reach 4	9.0	
LeClerc Creek, WA		present study
Reach 1	4.5	
Reach 2	2.6	
Reach 3	10.2	
Reach 4	9.0	
Ruby Creek, WA		present study
Reach1	8.6	
Reach 2	10.9	
Reach 3	31.6	
Reach 4	102.2	

Although cutthroat trout are known to be more aggressive than brook trout they are still displaced by the less aggressive species (Griffith 1972). Brook trout maintain a size advantage over equal-aged cutthroat trout as they emerge several months earlier than cutthroat trout. Griffith (1972) reported that underyearling brook trout dominated in experiments over the underyearling cutthroat trout with which they lived sympatrically. Stream gradient and available habitat may also limit cutthroat densities in the tributaries to the Pend Oreille River.

4.3 AGE, GROWTH, AND CONDITION

4.3.1 RIVER AND SLOUGHS

The mean length of largemouth bass at annulus formation was larger for the first three years in 1989 than in 1988 (Table 4.7). This difference is due, in part, to the use of a different intercept value in the back-calculation equation for the two years (See section 2.5). After the first three years, the back-calculated lengths at each annulus were similar. Even with the longer lengths in the first three years the growth of Pend Oreille River largemouth bass was still slower than in other locations in the northern and northwestern United States. Mean weights and lengths for each age class of bass were very similar in 1988 and 1989 (Table 4.8). The mean weights and lengths of younger fish tended to be higher in 1989 while the mean weights and lengths of older fish tended to be greater in 1988. Mean condition factors were virtually identical from 1988 and 1989.

Mean annual growth increments calculated for largemouth bass recaptures (Table 3.104) were larger than the growth increments from the back-calculations for 3+, 4+, 5+, 10+, 1 1+, and 12+. The growth for 6+, 9+ were similar by both methods. Growth increments for 7+, 8+, 13+, and 14+ were smaller for recaptured fish than the growth increments from back-calculations.

Yellow perch back-calculated growth and condition were very similar from 1988 and 1989 (Table 4.9). Yellow perch in the Pend Oreille were smaller at every annulus than at other locations in the northern and northwestern United States. Mean weights for every age class of yellow perch were only slightly higher in 1989 than 1988. Mean lengths for each age class were very similar for both

Table 4.6. Comparison of cutthoat trout densities (fish/100m²).

Location	Density	Reference
Homer Creek, ID	21.6	(Corsi and Elle 1989)
Preuss Creek, ID	8.0	(Schill and Heimer 1988)
Badger Creek, ID	19.9	(Maiolie and Cochnauer 1988)
Post Office Creek, ID	5.2	(Maiolie and Cochnauer 1988)
Wier Creek, ID	4.4	(Maiolie and Cochnauer 1988)
Lochsa River, ID	3.7	(Maiolie and Cochnauer 1988)
N. Fork Hayden Creek, ID	46.7	(Gamblin 1987)
E. Fork Hayden Creek, ID	24.5	(Gamblin 1987)
Black Canyon Creek, ID	10.3	(Gamblin 1987)
Scott Creek, ID	10.2	(Gamblin 1987)
Copper Creek, ID	8.9	(Gamblin 1987)
Omaha Creek, ID	7.9	(Gamblin 1987)
Hudlow Creek, ID	8.1	(Gamblin 1987)
Leiberg Creek, ID	8.0	(Gamblin 1987)
Tie Creek, ID	5.8	(Gamblin 1987)
Picnic Creek, ID	7.5	(Gamblin 1987)
S. Fork Snake River, ID	0.7	(Luken 1988)
Skookum Creek, WA		present study
Reach 3	2.1	
Reach 4	0.4	
Cee Cee Ah Creek, WA		present study
Reach 3	13.2	
Tacoma Creek, WA		present study
Reach 1	3.3	
Reach 2	4.3	
Reach 3	3.6	
Reach 4	4.5	
LeClerc Creek, WA		present study
Reach 2	1.1	
Reach 3	0.3	
Reach 4	0.4	
Ruby Creek, WA		present study
Reach 2	0.2	
Reach 3	≥ 0.5	

Table **4.7.** Comparison of mean back-calculated lengths at **annulus** formation and mean annual condition factors for largemouth bass.

	LENGTH AT ANNULUS FORMATION														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Potholes Reservoir, WA (Wydoski and Whitney 1979)	71	135	213	257	302	343	381	419	--	--	--	--	--	--	--
Sprague Lake, WA (Willms et *al.* 1989)	103	137	192	247	292	326	390	--	--	--	--	--	--	--	--
Washington State (Min Ave.) (Wydoski and Whitney 1979)	68	89	152	170	183	216	241	356	356	432	--	--	--	--	--
Washington State (Max Ave.) (Wydoski and Whitney 1979)	74	229	267	343	411	457	457	483	--	508	--	--	--	--	--
Lake Washington (Wydoski and Whitney 1979)	107	213	290	343	376	429	450	485	--	--	--	--	--	--	--
N. Idaho (6 lakes) (Reiman 1983)	68	136	213	279	336	386	405	440	463	484	--	--	--	--	--
Montana Lakes (Carlander 1977)	56	130	190	236	272	320	358	378	384	396	455	--	--	--	--
Oregon (96 waters) (Carlander 1977)	76	175	259	318	361	401	439	470	498	523	531	--	--	--	--
Wisconsin State Average (Carlander 1977)	84	188	267	318	356	384	414	442	460	475	495	505	513	523	--
Box Canyon Reservoir Pend Oreille River, WA (Barber et *al.* 1989)	66	102	142	198	241	280	317	355	387	412	427	461	467	473	--
Box Canyon Reservoir Pend Oreille River, WA (present study)	80	120	159	203	243	279	313	343	369	392	414	437	463	482	512

Table **4.7.** (cont.)

CONDITION FACTORS

Location	Age Class	Mean Condition Factor	Range	Reference Cited
Michigan Average	- -	K_{TL} 0.98	0.09-1.01	(Carlander 1977)
Wintergreen Lake, MI	- -	K_{TL} 1.33	- -	(Carlander 1977)
Pennsylvania Average	- -	K_{TL} - -	1.05-1.55	(Carlander 1977)
Sprague Lake, WA	I-VI	K_{TL} 1.57	- -	(Willms et *al.* 1989)
Loon Lake, WA	II-XIV	K_{TL} 1.41	- -	(Scholz et *al.* 1988)
Deer Lake, WA	III-IX	K_{TL} 1.27	- -	(Scholz et *al.* 1988)
Box Canyon Reservoir	I-XIV	K_{TL} 1.30	1.14-1.82	(Barber et *al.* 1989)
Box Canyon Reservoir	VII-XIV	K_{TL} 1.61	1.61-1.82	(Barber et *al.* 1989)
Box Canyon Reservoir	I-XV	K_{TL} 1.30	1.16-1.83	(present study)

Table **4.8.** Comparison of mean weights **(g** ± standard deviation) and mean lengths (mm ± standard deviation) for each age of largemouth bass from **1988** to **1989.**

Age Class	N	Mean Weight 1988	N	Mean Weight 1989
0+	12	2.8 ± 0.7	62	3.3 ± 1.5
1+	55	7.2 ± 2.4	179	7.0 ±3.8
2+	79	18.6 ± 7.2	130	22.5 ± 8.6
3+	195	34.8 ± 15.0	249	57.3 ± 20.8
4+	59	109.5 ± 46.7	47	108.0 ± 27.9
5+	51	252.3 ± 636	23	251.4 ± 144.4
6+	85	417.7 ± 110.7	26	413.6 ± 145.7
7+	50	625.7 ± 148.0	35	577.9 ± 115.6
8+	14	994.2 ± 288.2	46	778.4 ± 165.5
9+	17	1320.6 ± 384.7	28	1024.9 ± 169.9
10+	11	1495.8 ± 221.5	9	1304.4 ± 240.9
11+	10	1608.8 ± 445.0	9	1437.9 ± 233.2
12+	7	2144.0 ± 352.7	6	1746.3 ± 195.4
13+	1	2433	4	2065.3 ± 499.2
14+	2	2150.5 ± 29.0	3	2524.7 ± 278.6

Age Class	N	Mean Length 1988	N	Mean Length 1989
0+	12	57.2 ± 4.1	62	59.8 ± 10.4
1+	55	81.0 ± 7.9	179	80.8 ± 12.5
2+	79	116.0 ± 15.9	130	120.8 ± 16.2
3+	195	142.7 ± 17.9	249	168.0 ± 18.4
4+	59	203.7 ± 28.9	47	207.1 ± 12.8
5+	51	265.6 ± 17.6	23	263.1 ± 28.7
6+	85	306.7 ± 21.6	26	303.4 ± 20.1
7+	50	344.5 ± 22.7	35	339.3 ± 15.9
8+	14	387.7 ± 29.1	46	367.1 ± 16.6
9+	17	427.4 ± 30.1	28	398.4 ± 13.1
10+	11	443.4 ± 22.5	9	433.3 ± 15.6
11+	10	451.6 ± 29.4	9	438.4 ± 9.3
12+	7	489.3 ± 15.9	6	455.3 ± 14.4
13+	1	523	4	487.8 ± 28.7
14+	2	489.5 ± 7.8	3	494.4 ± 16.4

Table **4.9.** Comparison of mean back-calculated lengths at **annulus** formation and mean annual condition factors for yellow perch.

LENGTH AT **ANNULUS** FORMATION

	1	2	3	4	5	6	7	8
Lake Roosevelt, WA (Beckman et *al.* 1985)	87	168	213	242	267	288	304	--
Lake Washington, WA (Wydoski and Whitney 1979)	98	173	227	262	284	301	312	--
Lake Michigan (Schaefer 1977)	97	137	178	204	230	251	262	--
Loon Lake, WA (Scholz et *al.* 1988)	--	--	111	165	199	198	228	--
Lake Mendota, WI (Wydoski and Whitney 1979)	140	197	227	239	--	--	--	--
Deer Lake, WA* (Scholz et *al.* 1988)	--	--	150	161	182	190	232	--
Cascade Reservoir, ID (Griswold and Bjornn 1989)	70	129	178	211	237	255	251	272
Box Canyon Reservoir Pend Oreille River, WA (Barber *et al.* 1989)	77	95	114	134	150	166	206	--
Box Canyon Reservoir Pend Oreille River, WA (Present study)	70	92	114	133	150	166	200	211

*Based on mean annual total lengths.

CONDITION FACTORS

Location	Age Class	Mean Condition Factor	Range	Reference Cited
Loon Lake, WA	II-VI	K_{TL} 0.98	0.91-1.01	(Scholz et *al.* 1988)
Deer Lake, WA	II-VII	K_{TL} 1.19	1.08-1.32	(Scholz et *al.* 1988)
Lake Roosevelt, WA	I-V	K_{TL} 1.11	0.72-1.58	(Peone and Scholz 1988)
Cascade Reservoir, ID	I-VIII	K_{TL} 1.10	--	(Griswold and Bjornn 1989)
Box Canyon Reservoir	I-VII	K_{TL} 1.04	0.97-1.12	(Barber et *al.* 1989)
Box Canyon Reservoir	I-VIII	K_{TL} 1.08	1.05-1.16	(Present study)

years (Table 4.10). The mean condition factor was slightly higher in 1989, but still lower than most other locations in the region. The Pend Oreille River contains an extremely large population of stunted yellow perch.

The mean length of mountain whitefish at annulus formation was lower at each annulus in 1989 as compared to 1988 (Table 4.11). As with largemouth bass, this difference is due the the difference in the intercept used in the regression equation. Mountain whitefish growth was good in comparison to other water bodies in the western United States and Canada. Mean weights and lengths for each age class of mountain whitefish were similar in 1988 and 1989 (Table 4.12). The younger whitefish had slightly higher weights and lengths in 1989, and the older whitefish had slightly higher weights and lengths in 1988. The mean condition factor was slightly higher in 1989 over 1988. Mean annual growth increments calculated for recaptured mountain whitefish tagged with floy tags (Table 3.104) were smaller than the increments from the back-calculations. However, floy tags may have interfered with fish behavior, which could have resulted in reduced growth compared to fish without tags.

The mean back-calculated lengths of black crappie were similar from 1988 to 1989 (Table 4.13). Black crappie lengths at annulus formation tended to be smaller than those found in other bodies of water in the region. Mean weights and lengths for each age class of black crappie were generally higher in 1988 but were still similar to weights and lengths from 1989 (Table 4.14). Mean condition factors tended to be slightly lower in the Pend Oreille River than other locations.

The mean lengths of brown trout at annulus formation were similar between 1988 and 1989 for the first three years, but deviated after the third year (Table 4.15). The differences in length are, more than likely, due to small sample sizes. Pend Oreille River brown trout were smaller than at other locations in the United States at all but the first annulus. Mean weights and lengths for each age class of brown trout were higher for younger fish and lower for older fish in 1989 as compared to 1988 (Table 4.16). Mean condition factors were lower than in 1988 and lower than at other locations in the western United States.

Table **4.10.** Comparison of mean weights (g ± standard deviation) and mean lengths (mm ± standard deviation) for each age class of yellow perch in the **Pend Oreille** River from **1988** to **1989.**

Age Class	N	Mean Weight 1988	N	Mean Weight 1989
1 +	20	5.4 ± 2.8	33	5.6 ± 2.3
2 +	20	15.8 ± 4.8	23	17.2 ± 8.1
3 +	142	20.6 ± 5.8	144	27.7 ± 8.1
4 +	229	33.8 ± 9.0	300	36.0 ± 9.2
5 +	200	41.5 ± 8.6	367	43.7 ± 10.2
6 +	117	52.5 ± 13.2	208	55.3 ± 12.1
7 +	3	89.7 ± 18.0	5	97.6 ± 19.0

Age Class	N	Mean Length 1988	N	Mean Length 1989
1 +	20	79.5 ± 10.6	33	79.0 ± 10.3
2 +	20	111.0 ± 10.2	23	112.0 ± 18.8
3 +	142	122.3 ± 9.9	144	134.0 ± 11.8
4 +	229	144.7 ± 12.9	300	146.9 ± 10.4
5 +	200	160.7 ± 9.7	367	160.2 ± 10.0
6 +	117	175.0 ± 11.3	208	173.4 ± 9.6
7 +	3	208.0 ± 16.1	5	210.6 ± 19.1

Table **4.11** .**Comparison** of mean back-calculated lengths at **annulus** formation and mean annual condition factors for mountain whitefish.

	LENGTH AT **ANNULUS** FORMATION							
	1	2	3	4	5	6	7	8
Montana Lakes (Carlander 1969)	91	190	241	272	300	325	356	--
Montana Reservoir (Carlander 1969)	86	183	246	290	312	335	351	371
Montana Rivers (Carlander 1969)	86	180	246	292	328	353	368	419
Phelps Lake, MT (Carlander 1969)	160	193	229	251	269	290	307	318
Doctor Lake, MT (Carlander 1969)	46	84	119	157	193	226	254	282
Kootenai River, MT (May et *al.* 1983)	140	254	312	351	--	--	--	--
Wyoming Average (Carlander 1969)	99	206	262	290	318	338	--	__
Madison River, WY (Carlander 1969)	130	226	305	348	388	429	--	__
Logan River, UT (Carlander 1969)	117	206	259	295	325	358	391	417
Okanogan Lake, BC (Carlander 1969)	135	221	292	323	--	--	--	--
Box Canyon Reservoir Pend Oreille River, WA (Barber et *al.* 1989)	174	219	259	299	360	390	413	435
Box Canyon Reservoir Pend Oreille River, WA (present study)	138	199	244	279	355	--	--	--

CONDITION FACTORS

Location	Age Class	Mean Condition Factor		Range	Reference Cited
Logan River, UT	--	K_{SL}	1.57	--	(Carlander 1969)
Carter Creek, UT	--	K_{SL}	1.50	--	(Carlander 1969)
Pend Oreille River, WA	I-VII	K_{TL}	0.71	0.69-0.81	
		K_{SL}	1.15	1.10-1.26	(Barber et a/. 1989)
Pend Oreille River, WA	I-V	K_{TL}	0.74	0.69-0.81	
		K_{SL}	1.19	1.12-1.31	(Present study)

Table **4.12.** Comparison of mean weights **(g** ± standard deviation) and mean lengths (mm ± standard deviation) for each age class of mountain whitefish in the **Pend Oreille** River from **1988** to **1989.**

Age Class	N	Mean Weight 1988	N	Mean Weight 1989
1 +	38	20.0 ± 8.5	61	47.2 ± 20.4
2 +	37	64.2 ± 33.1	111	93.1 ± 25.4
3 +	113	141.2 ± 37.1	265	138.4 ± 34.7
4 +	51	186.1 ± 39.8	125	180.8 ± 45.2
5 +	15	488.1 ± 188.6	7	478.4 ± 265.8

Age Class	N	Mean Length 1988	N	Mean Length 1989
1 +	38	140.5 ± 22.1	61	183.0 ± 25.6
2 +	37	201.8 ± 34.4	111	230.5 ± 18.5
3 +	113	268.5 ± 23.2	265	265.2 ± 16.3
4 +	51	295.6 ± 21.3	125	292.1 ± 16.0
5 +	15	406.7 ± 40.2	7	376.1 ± 56.7

Table **4.13.** Comparison of mean back-calculated lengths at **annulus** formation and mean annual condition factors for black crappie.

	LENGTH AT **ANNULUS** FORMATION							
	1	2	3	4	5	6	7	8
Lake Washington, WA (Wydoski and Whitney 1979)	79	152	203	231	251	269	300	- -
Lake St. Clair, WA (Wydoski and Whitney 1979)	- -	- -	236	249	269	- -	- -	- -
Montana Lakes (Carlander 1977)	84	135	170	198	213	211	206	- -
Montana Streams (Carlander 1977)	56	117	165	221	218	- -	- -	- -
Three Forks Lake, MT (Carlander 1977)	28	61	94	122	145	168	178	- -
Oregon (28 waters) (Carlander 1977)	53	135	183	211	231	224	- -	- -
Minnesota Waters (Carlander 1977)	61	122	173	211	241	267	295	- -
Box Canyon Reservoir Pend Oreille River, WA (Barber et *al.* 1989)	72	104	136	170	209	228	241	- -
Box Canyon Reservoir Pend Oreille River, WA (present study)	74	109	142	168	180	207	226	237

CONDITION FACTORS

Location	Age Class	Mean Condition Factor		Range	Reference Cited
Chetek Lake, WI	- -	K_{TL}	1.68	1.42-1.88	(Carlander 1977)
Minnesota Average	- -	K_{TL}	—	1.22-1.50	(Carlander 1977)
Loon Lake, WA	—	K_{TL}	1.38	—	(Scholz et a/. 1988)
Deer Lake, WA	- -	K_{TL}	1.40	- -	(Scholz et a/. 1988)
Box Canyon Reservoir Pend Oreille River, WA	- -	K_{TL}	1.39	1.34-1.68	(Barber et *a/.* 1989)
Box Canyon Reservoir Pend Oreille River, WA	I-VIII	K_{TL}	1.36	1.21-1.42	(present study)

Table **4.14.** Comparison of mean weight (g ± standard deviation) and mean length (mm ± standard deviation) for each age class of black crappie in the **Pend Oreille** River from **1988** to **1989.**

Age Class	N	Mean Weight 1988	N	Mean Weight 1989
1 +	3	3.7 ± 1.5	6	9.7 ± 6.9
2 +	10	24.3 ± 6.5	4	23.5 ± 3.5
3 +	54	44.8 ± 16.1	55	60.1 ± 13.4
4 +	35	88.6 ± 20.4	90	85.6 ± 19.2
5 +	13	169.0 ± 29.1	10	82.4 ± 42.3
6 +	2	231.5 ± 96.9	12	134.3 ± 27.8
7 +	1	428	3	195.3 ± 81.0

Age Class	N	Mean Length 1988	N	Mean Length 1989
1 +	3	62.3 ± 10.5	6	86.6 ± 16.5
2 +	10	121.3 ± 9.8	4	123.6 ± 4.3
3 +	54	146.8 ± 17.7	55	163.3 ± 10.4
4 +	35	183.1 ± 13.0	90	183.4 ± 13.6
5 +	13	229.7 ± 10.2	10	175.7 ± 24.4
6 +	2	252.0 ± 38.2	12	212.6 ± 14.7
7 +	1	294	3	236.3 ± 28.4

Table **4.15.** Comparison of mean back-calculated lengths at **annulus** formation and mean annual condition factors for brown trout.

	LENGTH AT **ANNULUS** FORMATION								
	1	2	3	4	5	6	7	6	9
Average U.S. streams (Wydoski and Whitney 1979)	96	203	282	348	444	495	551	--	
Average U.S. lakes (Wydoski and Whitney 1979)	107	216	333	394	513	584	604	--	
Loon Lake, WA' (Scholz et *al.* 1988)	--	—	205	290	419	539	--	--	
Spokane River, WA (Baily and Saltes 1982)	89	196	274	368	419	470	--	--	
Chamokane Creek, WA (Uehara et *al.* 1988)	120	194	283	342	410	--	--	--	
Henry's Fork, ID (Brostrom and Spateholts 1985)	129	211	297	369	458	555	—	--	
Kootenai River, MT (May and Huston 1983)	104	216	295	365	--	--	—	--	
Missouri River, MT (Katherin 1951)	81	201	282	343	404	421	—	--	
Box Canyon Reservoir Pend Oreille River, WA (Barber et *al.* 1989)	98	167	249	341	411	468	507	--	
Box Canyon Reservoir Pend Oreille River, WA (present study)	101	170	240	311	375	423	472	519	517

*Based on mean annual total lengths.

CONDITION FACTORS

Location	Age Class	Mean Condition		Factor Range	Reference Cited
Montana Streams	I-V	K_{TL}	0.99	0.94-1.11	(Bishop 1955; Purkett 1951)
Missouri River, MT	II-V	K_{TL}	0.96	—	(Kathrein 1951)
Chamokane Creek, WA	I-V	K_{TL}	1.05	0.97-1.11	(Uehara et al. 1988)
Loon Lake, WA	II-V	K_{TL}	1.01	—	(Scholz et *al.* 1988)
Box Canyon Reservoir Pend Oreille River, WA	I-VII	K_{TL}	0.95	0.78-1.09	(Barber et *al.* 1989)
Box Canyon Reservoir Pend Oreille River, WA	I-IX	K_{TL}	0.90	0.87-1.04	(present study)

Table **4.16.** Comparison of mean weight (g ± standard deviation) and mean length (mm ± standard deviation) for each age class of brown trout in the **Pend Oreille** River from **1988** to **1989.**

Age Class	N	Mean Weight 1988	N	Mean Weight 1989
1 +	4	10.8 ± 8.5	18	19.1 ± 7.5
2 +	13	43.0 ± 28.2	17	92.7 ± 35.9
3 +	12	120.1 ± 50.8	27	193.5 ± 90.5
4 +	8	438.4 ± 123.1	4	520.8 ± 112.6
5 +	12	883.2 ± 278.9	3	876.7 ± 263.5
6 +	13	1298.2 ± 227.5	7	1101.6 ± 110.9
7 +	18	1890.7 ± 480.1	8	1317.5 ± 532.4

Age Class	N	Mean Length 1988	N	Mean Length 1989z
1 +	4	101.2 ± 25.8	18	128.8 ± 15.2
2 +	13	164.7 ± 36.4	17	218.0 ± 36.2
3 +	12	244.2 ± 33.5	27	271.5 ± 52.5
4 +	8	366.1 ± 26.3	4	387.8 ± 15.4
5 +	12	450.8 ± 29.2	3	479.9 ± 35.8
6 +	13	497.4 ± 30.6	7	484.2 ± 40.9
7 +	18	555.0 ± 34.6	8	512.9 ± 51.1

Mean annual growth increments calculated for brown trout recaptures (Table 3.104) did not compare with the growth increments from back-calculations.

Considering the small sample size for cutthroat trout, the mean back-calculated lengths from 1988 and 1989 were fairly close (Table 4.17). Pend Oreille River cutthroat trout growth was about average and mean condition factors were low in comparison to other bodies of water in the western United States.

Rainbow trout mean back-calculated lengths in 1989 were much larger after the second year than those in 1988 (Table 4.18). This is a result of a small sample size and a 905 mm rainbow trout captured in 1989. Mean condition factors were low in comparison to values found in the literature.

Mean weights and lengths of all target species in the Pend Oreille River tended to be higher for younger fish and lower for older fish in 1989 than in 1988. This may be a result of the water drawdown of the river in 1988. As previously mentioned, the drawdown dewatered the sloughs of the Pend Oreille River and may have caused density independent mortality of the younger age classes of fish or the species using those areas for spawning. It is possible that this resulted in reduced competition for the younger age classes of fish in the river which helps explain the higher weight and length values for 1989. Lower weights of older age classes of fish in 1989 could be a result of reduced food availability (i.e. young-of-the-year fish and benthic macroinvertebrates) in 1988, owing to dewatering, which would be translated as 1989 growth. The fact that these trends were observed in all target species indicates that the differences were real. However, there is a high degree of overlap within the standard deviations and the sample sizes for older age classes of fish were small both in 1988 and 1989.

While growth rates in the Pend Oreille River were below average as compared with other bodies of water in the region, fish do attain a respectable size. Largemouth bass in excess of 450 mm were relatively common. Brown trout attained lengths of 600 mm. A rainbow trout measuring 905 mm was captured as was a bull trout at 800 mm. Two other bull trout were captured measuring over 600 mm.

Table 4.17. Comparison of mean back-calculated lengths at annulus formation and mean annual condition factors for cutthroat trout.

	LENGTH AT ANNULUS FORMATION				
	1	2	3	4	5
Flathead Lake, MT (Leathe and Graham 1981)	57	109	173	247	--
North Fork Flathead River, MT (Fraley et *al.* 1981)	64	108	150	18	--
Thompson River, MT (Carlander 1969)	130	198	262	318	--
Priest Lake, ID (Wydoski and Whitney 1979)	81	135	211	300	--
Upper Priest Lake, ID (Carlander 1969)	94	142	216	292	--
Salmon River, ID (Carlander 1969)	107	150	213	279	--
Yellowstone Lake, WY (Wydoski and Whitney 1979)	46	130	224	312	--
Granby Reservoir, CO (Carlander 1969)	109	196	251	290	--
Box Canyon Reservoir Pend Oreille River, WA (Barber et *al.* 1989)	102	176	239	287	--
Box Canyon Reservoir Pend Oreille River, WA (present study)	87	141	222	290	324

CONDITION FACTORS

Location	Age Class	Mean Condition Factor Range			Reference Cited
W. Gallatin River, MT	--	K_{TL}	0.99	0.72-1.05	(Carlander 1969)
Pathfinder River, WY	--	K_{TL}	1.06	0.97-1.19	(Carlander 1969)
Upper No Name Lake	--	K_{TL}	1.05	--	(Carlander 1969)
Salmon River, ID	--	K_{FL}	1.30	--	(Carlander 1969)
St. Joe River, ID	--	K_{FL}	1.09	--	(Carlander 1969)
Box Canyon Reservoir Pend Oreille River, WA	II-V	K_{TL} K_{FL}	0.91 1.10	0.89-1.05 1.03-1.21	(Barber et *al.* 1989)
Box Canyon Reservoir Pend Oreille River, WA	I-V	K_{TL}	0.90	0.83-0.95	(present study)

Table **4.18.** Comparison of mean back-calculated lengths at **annulus** formation and mean annual condition factors for rainbow trout.

	LENGTH AT **ANNULUS** FORMATION					
	1	2	3	4	5	6
Sprague Lake, WA (Willms *et al.* 1989)	179	328	468	544	--	--
Ross Lake, WA (Wydoski and Whitney 1979)	122	266	345	383	406	--
Pend Oreille Lake, ID (Pratt 1985)	78	170	334	460	510	--
Spokane River, ID (Bennett and Underwood 1987)	147	232	319	386	--	--
Snake River, ID (Wydoski and Whitney 1979)	130	262	351	467	488	--
Montana Lakes 8 9 (Carlander 1969)	89	206	323	406	465	--
Kootanai River, MT (May and Huston 1983)	97	262	353	406	--	--
Missouri River, MT (Carlander 1969)	81	201	282	343	404	--
Box Canyon Reservoir Pend Oreille River, WA (Barber et a/. 1989)	105	154	233	321	387	--
Box Canyon Reservoir Pend Oreille River, WA (present study)	99	156	252	434	641	817

*Based on mean annual total lengths

CONDITION FACTORS

Location	Age Class	Mean Condition Factor		Range	Reference Cited
Sprague Lake, WA	I-III	KTL	1.15	--	(Willms et *a/.* 1989)
Loon Lake, WA	I-V	KTL	0.91	0.88-1 .07	(Scholz et *a/.* 1988)
Deer Lake, WA	I-V	KTL	1.07	1.04-1.11	(Scholz et *a/.* 1988)
Chamokane Creek, WA	I-V	KTL	1.04	1.00-1.10	(Uehara et al.1 988)
N. American Range	--	KTL	- -	1.00-1 .35	(Carlander 1969)
Box Canyon Reservoir Pend Oreille River, WA	II,V	KTL	0.90	0.86-1 .03	(Barber et a/. 1989)
Box Canyon Reservoir Pend Oreille River, WA	I-VI	KTL	0.91	0.84-0.99	(present study)

4.3.2 TRIBUTARIES

Given the small sample sizes of brown trout in some of the tributaries, the mean back-calculated lengths were similar from 1988 to 1989 (Table 4.19). Brown trout lengths from Pend Oreille River tributaries tended to be smaller at each annulus than for brown trout in other streams in the northwest.

Table 4.20 compares the mean back-calculated lengths of brook trout from Pend Oreille River tributaries in 1989 with those of 1988 and other streams in the Pacific Northwest. The mean lengths for each of the tributaries were comparable between years and tended to be larger than for other streams in the northwest.

Cutthroat trout growth in Pend Oreille River tributaries in 1989 was similar to 1988 and good in relation to other streams in the Pacific Northwest (Table 4.21).

4.4 FOOD AVAILABILITY IN THE RIVER, SLOUGHS, AND TRIBUTARIES

4.4.1 BENTHIC MACROINVERTEBRATE DENSITIES IN THE RIVER AND SLOUGHS

Mean annual densities of benthic macroinvertebrates collected from the Pend Oreille River during 1989 were greater than the 1988 densities at every site except 2 and 7 (Table 4.22). The mean density for all sites combined was 13,758 organisms/m2 in 1989 compared to 8,343 organisms/m2 in 1988. It is believed that the greater densities in 1989 were partly due to the change in the sampling scheme. Two of the three benthic samples were collected from the littoral zone, in 1989, instead of farther out into the profundal zone, as in 1988. This change was made since fish predominantly are found in the littoral areas. It is also possible that the drawdown of the reservoir in May of 1988, resulted in reduced populations of macroinvertebrates. During the drawdown, the reservoir was more riverene and the higher water velocities may have caused increased drifting of benthic macroinvertebrates.

Chironomidae larvae, Talitridae, Oligochaeta, and Sphaeriidae were the most prominent invertebrates in benthic samples collected from the Pend Oreille River during both 1988 and 1989 (Table 4.23).

Table **4.19.** Comparison of mean back-calculated lengths at **annulus** formation for **Pend Oreille** River tributary brown trout with other streams in the region.

	LENGTH AT **ANNULUS** FORMATION					
	1	2	3	4	5	6
East River, Priest River Drainage (Homer et *al.* 1987)	80	118	138	- -	- -	- -
Chamokane Creek, WA (Uehara *et al.* 1988)	104	195	285	373	424	686
Little Deschutes River, OR (Lorz 1974)	76	124	172	219	287	357
Browns Creek, OR (Lorz 1974)	102	190	296	397	469	517
Cranes Creek, ID (Corsi 1984)	127	243	348	412	446	- -
Lower Willow Creek, ID (Corsi 1984)	100	271	255	334	402	459
Robinson Creek, ID (Brostrum and Spateholts 1985)	107	171	245	295	318	321
Wyoming Creek, ID (Brostrum and Spateholts 1985)	115	212	269	- -	- -	- -
Skookum Creek (Barber *et al.* 1989)	80	132	192	264	- -	- -
Skookum Creek (present study)	77	134	179	205	219	- -
Cee Cee Ah Creek (Barber *et al.* 1989)	81	135	198	251	- -	- -
Cee Cee Ah Creek (present study)	68	121	177	240	- -	- -
Tacoma Creek (Barber et *al.* 1989)	93	164	212	- -	- -	- -
LeClerc Creek (Barber *et al.* 1989)	78	141	206	271	- -	- -
LeClerc Creek (present study)	72	132	225	300	392	- -
Ruby Creek (present study)	78	125	183	- -	- -	- -

Table **4.20.** Comparison of mean back-calculated lengths at **annulus** formation for **Pend Oreille** River tributary brook trout with other streams in the region

	LENGTH AT ANNULUS FORMATION		
	1	2	3
East River, Priest River Drainage (Horner et *al.* 1987)	84	124	158
Big Creek, Pend Oreille Drainage (Horner et *al.* 1987)	83	122	171
Upper West Branch River, Priest River Drainage (Horner et *al.* 1987)	88	124	148
Dinarch Creek, Priest River Drainage, (Horner et *al.* 1987)	84	121	152
Skookum Creek (Barber et a/. 1989)	86	128	199
Skookum Creek (present study)	89	137	154
Cee Cee Ah Creek (Barber et *al.* 1989)	92	134	195
Cee Cee Ah Creek (present study)	87	144	- -
Tacoma Creek (Barber et *a/.* 1989)	80	122	198
Tacoma Creek (present study)	80	129	- -
LeClerc Creek (Barber et a/. 1989)	89	121	188
LeClerc Creek (present study)	88	140	202
Ruby Creek (Barber et *al.* 1989)	88	147	- -
Ruby Creek (present study)	84	130	181

Table **4.21.** Comparison of mean back-calculated lengths at **annulus** formation for **Pend Oreille** River tributary cutthroat trout with other streams in the region.

	LENGTH AT ANNULUS FORMATION					
	1	2	3	4	5	6
North Fork Flathead Tributaries (Fraley et *al.* 1981)	54	96	135	166	202	--
Middle Fork Flathead Tributaries (Fraley et *al.* 1981)	51	95	139	193	251	--
East River, Priest River Drainage (Horner et *al.* 1987)	95	136	171	--	--	--
Big Creek, Priest River Drainage (Horner et al. 1987)	81	121	154	177	--	--
Kelly Creek, ID (Johnson and Bjornn 1978)	66	101	153	212	251	305
Upper St. Joe River, ID (Johnson and Bjornn 1978)	67	104	161	222	287	307
Salmon River, ID (Malet 1963)	57	95	165	241	305	352
Skookum Creek (present study)	101	136	--	--	--	--
Cee Cee Ah Creek (Barber et *al.* 1989)	96	135	--	--	--	--
Cee Cee Ah Creek (present study)	95	134	--	--	--	--
Tacoma Creek (Barber et *al.* 1989)	113	170	233	276	--	--
Tacoma Creek (present study)	101	140	182	--	--	--
LeClerc Creek (present study)	93	137	178	--	--	--
Ruby Creek (Barber et *al.* 1989)	97	157	--	--	--	--
Ruby Creek (present study)	104	158	223	--	--	--

Table **4.22.** Comparison of mean annual densities of bent **hic** macroinvertebrates **(#/m²)** collected from study sites on the **Pend Oreille** River during **1988** and **1989.** Number of samples enclosed in parentheses.

STUDY SITE	1988		1989	
1	4,508	(11)	7,568	(18)
2	9,191	(9)	5,715	(18)
3	5,124	(14)	16,773	(18)
4	10,775	(13)	13,828	(18)
5	12,499	(15)	16,489	(18)
6	5,709	(14)	24,005	(18)
7	17,234	(13)	14,763	(18)
8	9,976	(14)	11,835	(18)
9	9,353	(15)	9,852	(18)
10	4,576	(14)	19,463	(18)
11	8,013	(10)	11,049	(18)
All sites combined	8,343	(142)	13,758	(198)

Table **4.23.** Comparison of the top **benthic** macroinvertebrates, by percent abundance, from samples collected from the **Pend Oreille** River during **1988** and **1989.**

1988		1989	
Chironomidae larvae	32.3	Chironomidae larvae	23.4
Oligochaeta	31.1	Talitridae	14.6
Sphaeriidae	7.8	Oligochaeta	12.1
Talitridae	2.4	Sphaeriidae	8.5

Benthic macroinvertebrate densities in the Pend Oreille River were lower than those found in Kootenai River, MT but higher than those from Fisher River, Flathead River, and Libby Reservoir, MT and Lake Roosevelt, WA (Table 4.24).

Mean densities of benthic macroinvertebrates collected from the sloughs of the Pend Oreille River during 1989 were greater than 1988 densities for every site (Table 4.25). Chironomidae larvae and Oligochaeta composed a major percent of invertebrates collected from the slough samples at every site during both years (Table 4.26). The slough sampling techniques were uniform for 1988 and 1989, so the differences in invertebrate abundance in the sloughs was not an artifact of the sampling scheme. Some of the sloughs were nearly dewatered by the drawdown in May of 1988 and this could account for the lower macroinvertebrate densities. This also suggests that part of the decline in benthic macroinvertebrates observed in the river between 1988 and 1989 was attributable to the drawdown.

4.4.2 BENTHIC MACROINVERTEBRATE DENSITIES IN THE TRIBUTARIES AND INVERTEBRATE ABUNDANCE IN THE DRIFT

Benthic macroinvertebrate densities were lower in 1989 than in 1988 for all five of the Pend Oreille River tributaries sampled (Table 4.27). Chironomidae larvae, Baetidae, Heptageniidae, and Elmidae larvae were among the most common families in all of the tributaries during 1988 and 1989. (Table 4.28). When compared with other streams of the same general size in the region, the benthic macroinvertebrate densities of Pend Oreille tributaries tended to be low (Table 4.29).

Greater macroinvertebrate densities were found in Cee Cee Ah and Tacoma Creek drift samples in 1989, when compared with 1988 values (Table 4.30). Densities from Skookum Creek were substantially lower in 1989 than in 1988 and densities from LeClerc Creek were the same for both years. Drift densities for other streams in the region were not found in the literature so no comparisons were made. Percent composition of major invertebrate families in the drift of each tributary was generally the same for both years (Table 4.31).

The low densities of benthic macroinvertebrates in the study tributaries limits the potential for improving trout populations.

Table **4.24.** Comparison of **benthic** macroinvertebrate densities and diversity indices from the **Pend Oreille** River with other reservoirs and rivers in the region.

Location	Density #/m2	Diversity	Sampling Device	Reference
Kootenai River, MT				
Dunn Creek Station	28,112	1.64	Hess	(Perry and Huston 1983)
Elkhorn Station	18,486	2.38	Hess	(Perry and Huston 1983)
Pipe Creek Station	19,606	2.44	Kicknet	(Perry and Huston 1983)
Fisher River, MT	10,676	3.6	Hess	(Perry and Huston 1983)
Lake Roosevelt, WA				
Sanpoil Station	3,241	- -	Unknown	(Beckman 1985)
Porcupine Bay Station	5,897	- -	Unknown	(Beckman 1985)
Gifford Station	6,302	- -	Unknown	(Beckman 1985)
Colville Station	9,352	- -	Unknown	(Beckman 1985)
Flathead River	6,412	3.05	Kicknet	(Perry and Graham 1982)
Libby Reservoir, MT				
Tenmile Area	639	- -	Peterson	Chisholm and Fraley 1985)
Rexford Area	1,074	- -	Peterson	Chisholm and Fraley 1985)
Pend Oreille River, WA	8,343	3.072	Ponar	(Barber et *al.* 1989)
Pend Oreille River, WA	13,758	- -	Ponar	Present study

Table **4.25.** Comparison of mean annual densities of **benthic** macroinvertebrates **(#/m^2)** collected from sloughs of the **Pend Oreille** River during **1988** and **1989.** Number of samples enclosed in parentheses.

STUDY SITE	1988		1989	
3A	7,276	(14)	8,387	(15)
4A	6,415	(11)	22,642	(15)
5A	13,354	(15)	29,006	(15)
6A	12,095	(11)	38,629	(15)

Table **4.26.** Comparison of the top **benthic** macroinvertebrates, by percent abundance, found in the sloughs of the **Pend Oreille** River during **1988** and **1989.**

1988		1989	
SITE 3A			
Oligochaeta	62.9	Chironomidae larvae	29.8
Chironomidae larvae	10.9	Oligochaeta	22.5
Planariidae	8.5	Talitridae	8.7
SITE 4A			
Chironomidae larvae	30.6	Chironomidae larvae	27.4
Planorbidae	28.9	Oligochaeta	25.2
Oligochaeta	21.6	Nematoda	8.9
SITE 5A			
Oligochaeta	34.4	Nematodae	37.3
Chironomidae larvae	24.8	Chironomidae larvae	27.6
Ceratopogonidae	9.3	Oligochaeta	12.2
SITE 6A			
Oligochaeta	37.9	Talitridae	21.5
Planorbidae	15.5	Tricorythidae	17.7
Chironomidae larvae	13.3	Chironomidae larvae	14.4

Table **4.27.** Comparison of mean annual densities of **benthic** macroinvertebrates **(#/m²)** collected from tributaries of the **Pend Oreille** River during **1988** and **1989.** Number of samples enclosed in parentheses.

STUDY SITE	1988		1989	
LeClerc Creek	4823	(17)	4453	(20)
Cee Cee Ah Creek	5921	(17)	3343	(23)
Tacoma Creek	4907	(13)	3608	(9)
Skookum Creek	4972	(14)	4658	(24)

Table **4.28.** Comparison of the top bent**hic** macroinvertebrates, by percent abundance, from samples collected from the **Pend Oreille** River during **1988** and **1989.**

1988		1989	
LECLERC CREEK			
Chironomidae larvae	15.9	Chironomidae larvae	31.4
Baetidae	15.3	Baetidae	27.3
Naididae	14.8	Ephemerellidae	7.2
CEE CEE AH CREEK			
Elmidae larvae	20.2	Chironomidae larvae	30.3
Chironomidae larvae	15.8	Baetidae	17.6
Heptageniidae	14.6	Elmidae	11.8
Baetidae	11.5	Heptageniidae	7.2
TACOMA CREEK			
Chironomidae larvae	26.7	Elmidae larvae	25.0
Elmidae larvae	19.6	Baetidae	21.9
Baetidae	9.7	Brachycentridae	8.3
SKOOKUM CREEK			
Chironomidae larvae	25.1	Baetidae	14.9
Baetidae	9.8	Heptageniidae	12.7
Heptageniidae	8.9	larvae	12.2

Table **4.29.** Comparison of **benthic** macroinvertebrate densities and diversity indices from the **Pend Oreille** tributaries with other streams of similar stream order.

Location	Stream Order	Density $\#/m^2$	Diversity	Sampling Device	Reference
Firehole River, WY	- -	940	- -	Hess	(Armitage 1958)
Chamokane Creek, WA	3	53,569	3.27	Hess	(O'Laughlin 1988)
Upper Blue Creek, WA	2	18,122	3.6	Hess	(Cairns et al.1 988)
Middle Blue Creek, WA	2	2,738	2.83	Hess	(Cairns et al.1 988)
Lower Blue Creek, WA	2	7,879	3.23	Hess	(Cairns et al.1 988)
Oyachen Creek, WA	1	5,010	3.1	Hess	(Cairns et al.1 988)
Mink Creek, ID (1968)	3	6,900	- -	Hess	(Minshall 1981)
Mink Creek, ID (1969)	3	21,000	3.7	Hess	(Minshall 1981)
Strawberry River, UT	- -	8,800	- -	Basket	(Payne 1979)
Skookum Creek, WA	1	4,972	3.908	Hess	(Barber et *al.* 1989)
Cee Cee Ah Creek, WA	2	5,921	3.683	Hess	(Barber et *al.* 1989)
Tacoma Creek	3	4,907	3.476	Hess	(Barber et *al.* 1989)
LeClerc Creek	3	4,823	3.644	Hess	(Barber et *al.* 1989)
Skookum Creek, WA	1	4,658	- -	Hess	Present study
Cee Cee Ah Creek, WA	2	3,343	- -	Hess	Present study
Tacoma Creek, WA	3	3,608	- -	Hess	Present study
LeClerc Creek, WA	3	4,453	- -	Hess	Present study

Table **4.30** Comparison of mean annual densities of macroinvertebrates **(#/100 m^3)** collected from drift samples in tributaries of the **Pend Oreille** River during **1988** and **1989.** Number of samples enclosed in parentheses.

STUDY SITE	1988		1989	
LeClerc Creek	126	(12)	127	(12)
Gee Cee Ah Creek	68	(12	103	(24)
Tacoma Creek	111	(8)	158	(10)
Skookum Creek	282	(10)	97	(24)

Table **4.31** Comparison of the top invertebrates, by percent composition, in drift samples collected in tributaries of the **Pend Oreille** River during **1988** and **1989.**

1988		1989	
LECLERC CREEK			
Chironomidae larvae	16.7	Baetidae	23.7
Baetidae	8.8	Chironomidae larvae	15.7
Nemouridae	8.8	Chironomidae pupae	13.5
CEE CEE AH CREEK			
Chironomidae	10.0	Chironomidae larvae	16.2
Brachycentridae	9.6	Nematodae	10.9
Elmidae larvae	9.1	Baetidae	9.3
TACOMA CREEK			
Elmidae adult	24.7	Chironomidae larvae	18.6
Chironomidae pupae	17.6	Brachycentridae	18.2
Elmidae larvae	9.2	Ephemerellidae	10.8
SKOOKUM CREEK			
Chironomidae larvae	63.0	Baetidae	25.4
Baetidae	10.2	Chironomidae larvae	15.1
Chronomidae pupae	5.7	Chironomidae pupae	11.3

Most of the tributaries are high gradient, low order streams which are typically unproductive. The poor growth of brown trout in the tributaries is probably related to food availability. The trout and benthic macroinvertebrate habitat in the tributaries is generally good with the exception of lower Skookum Creek and Tacoma Creek. Lower Skookum Creek flows through agricultural land and typically has a mud and silt substrate areas with little riparian vegetation. The dominant substrate type in Tacoma Creek is sand as a result of a erosion due to poor road placement.

4.4.3 ZOOPLANKTON

For comparison purposes March, 1989 were not included since samples were not collected in March, 1988. Zooplankton densities from mid-channel of 'the Pend Oreille River during 1989 were lower than 1988 for every month except June (Table 4.32). The mean annual density was 112 organisms/liter in 1989, compared to 121 organisms/liter in 1988. Zooplankton densities of samples collected from the littoral areas of the river in 1989 were higher than densities from the mid-channel in 1989 for every month, except June.

Densities of major zooplankton taxa changed from 1988 to 1989. In 1988, there were 8.38 cladocerans/liter, compared to 5.35 cladocerans/liter in 1989 (Table 4.33). Copepods decreased from 27.05 organisms/liter in 1988, to 16.93 organisms/liter in 1989 . Rotifers increased slightly from 1988 to 1989.

Total biomass for cladocerans in the Pend Oreille River was 11.3 μg/l in 1989, a decrease from 22.9 μg/l in 1988 (Table 4.34).

A possible explanation for the decreases in cladoceran and copepod densities and cladoceran biomass in 1989 is that zooplankton were flushed through the reservoir by the higher flows. At higher flows, mid-channel zooplankton densities in the reservoir would reflect the density and biomass of zooplankton in Lake Pend Oreille, which was very low (Bowles et *al.*1989). It is also possible that the 1989 densities were effected by an extreme cold spell during February and March of 1989.

A comparison of the densities of cladocerans and copepods found in lakes and reservoirs in the region with the mean number found in the Pend Oreille River can be found in Table 4.35. The Pend

Table **4.32.** Comparison of **zooplankton** density (organisms/liter) in samples collected from mid-channel, in **1988** and **1989,** and littoral sites, in **1989,** of the **Pend Oreille** River.

	1988 Mid-channel	1989 Mid-channel	1989 Littoral
APRIL	97	38	43
JUNE	326	386	302
JULY	82	65	191
SEPTEMBER	54	34	84
OCTOBER	45	39	76
ANNUAL MEAN	120.5	112.4	139.2

Table **4.33.** Comparison of the densities of major zooplankton **taxa** (organisms/liter) in samples collected from mid-channel, in **1988** and **1989,** and littoral sites, in **1989,** of the **Pend Oreille** River.

	1988 Mid-channel	1989 Mid-channel	1989 Littoral
CLADOCERA	8.38	5.35	24.20
COPEPODA	27.05	16.93	29.67
ROTIFERA	85.11	89.95	85.51
TOTAL	120.54	112.23	139.38

Table **4.34** Comparison of total **cladoceran** biomass **(μg/l)** in samples collected from mid-channel, in **1988** and **1989,** and littoral sites, in **1989,** of the **Pend Oreille** River.

	1988 Mid-channel	1989 Mid-channel	1989 Littoral
April	5.8	2.8	2.5
June	20.7	13.7	34.5
July	53.3	22.7	110.2
September	12.7	11.6	24.4
October	22.1	5.9	7.5
Mean	22.9	11.3	35.8

Table **4.35.** Comparison of **zooplankton** densities from the **Pend Oreille** River with other lakes and reservoirs in the region.

Location	Cladocera Mean #/l	Copepoda Mean #/l	Sampling Device	Reference Cited
Coeur d'Alene Lake, ID	10.76	56.36	Miller	(Minter 1971)
Coeur d'Alene River Delta	10.46	46.03	Miller	(Minter 1971)
Libby Reservoir, MT				
Tenmile Area	3.69	10.35	Wisconsin	(Chisholm and Fraley1985)
Rexford Area	3.6	8.96	Wisconsin	(Chisholm and Fraley1985)
Canada Area	4.23	4.05	Wisconsin	(Chisholm and Fraley1985)
Flathead Lake, MT	3.73	7.17	Wisconsin	(Beattie et al. 1985)
Lake Roosevelt, WA	6.87	8.66	Clarke-Bumpus	(Beckman et *al.* 1985)
Lake Roosevelt, WA				
Kettle Falls	3.98	0.80	Clarke-Bumpus	(Peone et *a/.* 1990)
Gifford	5.12	1.20	Clarke-Bumpus	(Peone et *al.* 1990)
Hunters	7.12	0.88	Clarke-Bumpus	(Peone *et al.* 1990)
Porcupine Bay	12.13	15.20	Clarke-Bumpus	(Peone et *al.* 1990)
Little Falls	2.96	9.65	Clarke-Bumpus	(Peone et *al.* 1990)
Seven Bays	3.40	5.74	Clarke-Bumpus	(Peone et *al.* 1990)
Keller Ferry	0.96	8.32	Clarke-Bumpus	(Peone et *a/.* 1990)
San Poil	2.29	9.24	Clarke-Bumpus	(Peone *et a/.* 1990)
Spring Canyon	1.63	6.28	Clarke-Bumpus	(Peone et al. 1990)
Pend Oreille Lake, ID (1974)	8.8	18.45	Miller	(Reiman 1976)
Pend Oreille Lake, ID (1975)	6.02	6.53	Miller	(Reiman 1976)
Pend Oreille Lake, ID (1978)	1.71	13.96	Miller	(Reiman and Bowler1 980)
Pend Oreille Lake, ID (1985)	1.00	13.00	Miller	(Bowles *et* a/. 1989)
Pend Oreille Lake, ID (1986)	1.26	12.92	Miller	(Bowles *et al.* 1989)
Pend Oreille Lake, ID (1987)	1.67	14.83	Miller	(Bowles *et* al. 1989)
Pend Oreille Lake, ID (1988)	1.00	21.67	Miller	(Bowles et *al.* 1989)
Pend Oreille River, WA	8.38	27.05	Wisconsin	(Barber *et a/.* 1989)
Pend Oreille River, WA	4.58	15.38	Wisconsin	(Present study)

Oreille River densities were about average in comparison other lakes and reservoirs in the region.

4.5 RIVER AND SLOUGH FISH FEEDING HABITS

Benthic macroinvertebrates were more important to the diet of yellow perch in 1989 than in 1988 (Table 4.36), probably owing to a decrease in zooplankton density and an increase in benthic macroinvertebrate density in 1989. There were no major changes in the most important prey items for largemouth bass (Table 4.37) and mountain whitefish (Table 4.38). Benthic macroinvertebrates were more important, relative to zooplankton, to black crappie in 1989 than in 1988 (Table 4.39). Brown trout fed primarily on benthic organisms in both 1988 and 1989 (Table 4.40).

Changes in diet overlaps occurred between several species of fish found in the Pend Oreille River (Table 4.41). Most of the overlap changes were from moderate overlaps in 1988 to high in 1989. In general the high diet overlaps were the result of many species of fish utilizing, to a high degree, chironomid larvae, Daphnidae, and Chydoridae.

Electivities were similar for 1988 and 1989. Most fish species were opportunistic in their consumption of benthic organisms but several species of fish selected for zooplankton.

Benthic macroinvertebrate densities in the sloughs were as much as three times greater in 1989 than 1988. These greater densities along with reduced competition due to the drawdown in 1988 may have resulted in the higher weights and lengths found in the younger age classes of fish in 1989. Densities of benthic macroinvertebrates were also greater in the river in 1989 but zooplankton densities were lower. As a result diet overlaps were much higher in 1989.

4.6 FISH MOVEMENT AND MIGRATION

Most fish in the Pend Oreille River were recaptured in the same location as they were tagged and fish that had moved tended to move only short distances. Many of the largemouth bass that had moved were displaced by bass anglers during a bass tournament. A sonic and radio tracking study is being conducted on largemouth bass to provide better information on bass movement and habitat use.

Table **4.36.** Comparison of prey items with the highest Index of Relative Importance **(IRI)** values for yellow perch (all age classes combined) in the **Pend Oreille** River in **1988** and **1989.**

1988	N=565	1989	N=609
Prey Item	IRI value	Prey Item	IRI value
Chydoridae	9.9	Chironomidae larvae	16.5
Daphnidae	8.2	Baetidae	14.2
Chironomidae larvae	8.4	Daphnidae	9.5
Baetidae	8.0	Chironomidae pupae	8.4
Planorbidae	6.7	Chydoridae	6.7

Table **4.37.** Comparison of prey items with the highest Index of Relative Importance **(IRI)** values for largemouth bass (all age classes combined) in the **Pend Oreille** River in **1988** and **1989.**

1988	N=321	1989	N=336
Prey Item	IRI value	Prey Item	IRI value
Osteichthyes	[illegible]	Osteichthyes	54.7
Baetidae	[illegible]	Baetidae	14.6
Chydoridae	6.2	Chydoridae	4.6
Chironomidae pupae	4.3	Chironomidae larvae	4.6
Daphnidae	4.0	Coenagrioniidae	4.4

Table **4.38.** Comparison of prey items with the highest Index of Relative Importance **(IRI)** values for mountain whitefish (all age classes combined) in the **Pend Oreille** River in **1988** and **1989.**

1988	N=208	1989	N=279
Prey Item	IRI value	Prey Item	IRI value
Chironomidae larvae	42.5	Chironomidae larvae	37.8
Chironomidae pupae	13.0	Hydroptilidae	11.1
Coenagrioniidae	6.1	Chironomidae pupae	6.8
Hydracarina	4.8	Simuliidae larvae	5.8
Hydroptilidae	4.1	Chydoridae	5.0

Table **4.39.** Comparison of prey items with the highest Index of Relative Importance **(IRI)** values for black crappie (all age classes combined) in the **Pend Oreille** River in **1988** and **1989.**

1988	N=208	1989	N=279
Prey Item	IRI value	Prey Item	IRI value
Daphnidae	28.8	Chironomidae larvae	16.3
Chydoridae	8.9	Cyclopoida	14.0
Cyclopoida	8.7	Ceratopogonidae	13.0
Chironomidae larvae	7.7	Chironomidae pupae	11.4
Chironomidae pupae	7.5	Chydoridae	10.7

Table **4.40.** Comparison of prey items with the highest Index of Relative Importance **(IRI)** values for brown trout (all age classes combined) in the **Pend Oreille** River in **1988** and **1989.**

1988	N=28	1989	N=18
Prey Item	IRI value	Prey Item	IRI value
Baetidae	18.9	Coenagrioniidae	21.3
Elmidae	14.7	Chironomidae pupae	20.1
Chironomidae	11.9	Ephemerellidae	20.0
Terrestrial insects	9.6	Baetidae	10.8
Coenagrioniidae	8.9	Oligochaeta	7.6

Table 4.41. Change in diet overlaps of fish in the Pend Oreille River between 1988 and 1989.

Low overlap 1988 to Moderate overlap 1989
Yellow perch - Mountain whitefish
Low overlap 1988 to High overlap 1989
Pumpkinseed - Largescale sucker
Moderate overlap 1988 to High overlap 1989
Yellow perch - Pumpkinseed
Yellow perch - Brown bullhead
Mountain whitefish - Largescale sucker
Pumpkinseed - Tench
Brown bullhead - Tench
Brown bullhead - Largescale sucker
Tench - Largescale sucker
Largescale sucker - Longnose sucker
High overlap 1988 to Low overlap 1989
Mountain whitefish - Brown bullhead

4.7 CREEL SURVEY

Comparisons of total catch and harvest for 1988 and 1989 are found in Table 4.42. The CPUE in 1989 for total catch, was more than twice the CPUE for total catch in 1988. The estimated total catch (including fish released) was 18,171 fish in 1989 as compared to 10,082 fish in 1988. This difference was owing, in part, to the fact that the 1988 drawdown of the reservoir occurred during the peak of the fishing season. The number of fish harvested by anglers was higher in 1988 than in 1989, with an estimate of 2,505 ± 312 fish kept in 1988, compared to 1,331 ± 164 in 1989. Overall estimates of fishing pressure for both boat and shore anglers were higher in 1988 than in 1989 (Table 4.43).

4.8 CONCLUSIONS

The habitat in the Pend Oreille River does not appear to be suitable for the production of trout. Trout require more habitat diversity than Box Canyon reach of the Pend Oreille River provides. The tributaries also have limited potential to produce large numbers of trout that could be recruited into the fishery in the reservoir. One management recommendation for the tributaries would be to manage the tributaries for native species, such as cutthroat trout and bull trout. One way to accomplish this would be to discontinue the stocking of brook trout and actively remove the existing stocks, which compete with the native species. Native species of cutthroat trout and bull trout could then be planted in order to restore the tributary fishery to its original composition. This may require building a low capital facility to stock native species annually.

Any effort to improve habitat or enhance fish populations in the river should be directed towards largemouth bass. Largemouth bass are the only sport species with a large enough population, of individuals of sufficient size to attract anglers. Most of the angler pressure, for anglers who had a preference, was for largemouth bass both in 1988 and 1989. In addition several bass tournaments are held on the reservoir each year. The sport catch of largemouth bass nearly tripled in 1989 over 1988 even though angler pressure went down. The drawdown was partly responsible for the lower total catch numbers in 1988 since it occurred during the normal peak of bass angling, but the bass fishery on the Pend Oreille River is increasing in popularity.

Table **4.42.** Comparison of annual estimates of catch ± **95% C.I.** (including fish **released),total** harvest **(±** **95%** CI) and **CPUE** for the **Pend Oreille** River, WA in **1988** and **1989.**

	TOTAL CATCH		HARVEST	
	1988	1989	1988	1989
CPUE (Fish/Hour)	2.44	5.89	0.61	0.41
Largemouth Bass	3434±320	9402±1169	389±40	103±12
Yellow Perch	4519±588	6120±754	1268±157	684±84
Black Crappie	69±8	719±89	41±4	
Brown Trout	36±4	91±11	36±4	68±9
Bull Trout		181±23		181±23
Cutthroat trout	91±12		86±11	
Rainbow trout	20±3		20±2	
Mountain Whitefish	146±21	34±4	75±11	11±2
Pumpkinseed	757±94	718±88	278±39	182±22
Northern Squawfish	411±47	826±101		102±12
Peamouth	15±2	46±5		
Tench	7±1	34±4		
Brown bullhead	549±77		312±44	
Sucker	28±4			
TOTAL	10,082±1181	18,171±2248	2505±312	1331±164

Table **4.43** Comparison of pressure estimates from **1988** and **1989** for each strata on the **Pend Oreille River,WA.**

LOCATION	1988	1989
SECTION 1		
Weekdays (boat)	544±45	325±32
Weekdays (shore)	750±104	245±31
Weekends (boat)	338±37	327±38
Weekends (shore)	271±53	432±48
SECTION 2		
Weekdays (boat)	252±25	379±31
Weekdays (shore)	326±46	97±13
Weekends (boat)	351±31	391±31
Weekends (shore)	238±46	155±29
SECTION 3		
Weekdays (boat)	270±22	270±31
Weekdays (shore)	71±7	188±18
Weekends (boat)	535±44	197±40
Weekends (shore)	193±18	23±6
TOTAL PRESSURE		
Boat anglers	2290±204	1889±229
Shore anglers	1849±274	1140±145
All anglers	4139±478	3029±374

The primary prey of largemouth bass was yellow perch which, even with a lower population than previously thought, are abundant in sufficient numbers to sustain a larger bass population. The habitat needs of largemouth bass will be better understood after completion of a sonic and radio tracking study currently under way. If it is determined that the Pend Oreille River contains sufficient habitat for an expanded largemouth bass population, or that the habitat could be improved to accommodate a larger population, then a hatchery could be constructed to raise largemouth bass. Since bass growth tends to be depressed until they reach a size that enables them to eat fish, they could be held in ponds, if economically feasible, until they reach a size near 200 mm. A more economical method may be to release large numbers of bass larvae, but this may result in the depletion of the food supply and high density dependent mortality.

LITERATURE CITED

Armitage, P.D., A.M. Machale, and D.T. Crisp. 1958. A survey of stream invertebrates in the Cow Green basin (Upper Teesdale) before inundations. Freshwater Biology. 4:369-398.

Baily, G.C. and J. Salts. 1982. Fishery assessment of the upper Spokane River. Proj. Completion Report. State of Washington Water Research Center, Report No. 46. Wash. State Univ., Pullman, WA. 111 pp.

Barber, M.R., R.A. Willms, A.T. Scholz, L.O. Clark, B.L. Renberg, K. O'Laughlin, K.L. Woodward, and R.D. Heaton. 1989. Assessment of the fishery improvement oppurtunities on the Pend Oreille River. 1988 Annual Report. Upper Columbia United Tribes Fisheries Center, Dept. of Biology, EWU, Cheney, WA. prepared for U.S. Dept. of Energy, Bonneville Power Administration, Div. of Fish and Wildl. Project No. 99-66, Agreement DE-179-88BP39339. 391 pp.

Beattie, W., P. Clancy, J. Decker-Hess, and J. Fraley. 1985. Impacts of water level fluctuations on kokanee reproduction in Flathead Lake. Montana Dept. Fish, Wildl. and Parks. Annual Progress Report prepared for U.S. Dept. of Energy, Bonneville Power Administration. Contract No. DE-AI 79-83BP39641. 57 pp.

Beckman, L.G., J.F. Novotny, W.R. Persons, and T. Terrell. 1985. Assessment of the fisheries and limnology in Lake F.D. Roosevelt, 1980-83. U.S. Fish, Wildl. Serv. U.S. Bureau of Rec. Contract No. WPRS-0-07-10-X0216. FWS-14-06-009-904.

Bennett, D.H., and T.J. Underwood. 1988. Population dynamics and factors affecting rainbow trout (*Salmo gairdneri*) in the Spokane River, ID. Completion Report No. 3. Washington Water Power Co., Spokane, WA.

Bishop, C.G. 1955. Age, growth and condition of trout in Prickly Pear Creek, Montana. Trans. Amer. Microscop. Soc. LXXIV(2): 134-45.

Bowles, E.C., V.L. Ellis, and B. Hoelscher. 1989. Kokanee stock status and contribution of Cabinet Gorge Hatchery, Lake Pend Oreille, Idaho. Annual Progress Report FY 1988 prepared for U.S. Dept. of Energy, Bonneville Power Administration, Div. of Fish and Wildl. Project No. 85-339, Contract No. DE-AI79-85BP22493. 60 pp.

Brostrom, J., and R. Spateholts. 1985. Henry's Fork fisheries investigations. Idaho Dept. of Fish and Game, Job Performance Report, Project F-73-R-6, Subproject IV, Job. 1. 51 pp.

Cairns, S.C., B.Z. Lang and A.T. Scholz. 1988. Further investigations on the impact of Midnite Mine effluent on the benthic macroinvertebrate community in Blue Creek: Trends in density and diversity of benthic macroinvertebrate collected in pre-impact and recovery zones. Upper Columbia United Tribes Fisheries Center, Fisheries Technical Report No 22. Final Report Submitted to the Bureau of Indian Affairs. Contract No. P00C140848. 132 pp.

Carlander, K.D. 1969. Handbook of freshwater fishery biology. Vol. 1. Iowa State University Press. Ames, Iowa. 752 pp.

Carlander, K.D. 1977. Handbook of freshwater fishery biology. Vol. 2. Life history data on centrarchid fishes of the United States and Canada. Iowa State University Press. Ames, Iowa. 431 pp.

Chisolm, I. and J. Fraley. 1985. Quantification of Libby Reservoir levels needed to maintain or enhance reservoir fisheries. Annual Report, Montana Department of Fish, Wildl. and Parks. Prepared for Bonneville Power Administration. Contract No. DE-AI 79-84BP12660. 65 pp.

Corsi, C. 1984. Region 6 Willow Creek Drainage fishery inventory. Idaho Dept. of Fish and Game, Job Performance Report, Project F-71-R-8. 93 pp.

Corsi, C. and S. Elle. 1989. Regional fisheries management investigations, Idaho Dept. of Fish and Game. Job Performance Report, Project F-71-R-12. 57 pp.

Downing, J. A. and F.H. Rigler. 1984. A manual on methods for the assessment of secondary productivity in fresh waters. 2nd. Ed. IBP Handbook No. 17. 500 pp.

Fraley, J.J., D. Read, and R.P. Graham. 1981. Flathead River fishery study. Montana Dept. of Fish, Wildl. and Parks. Helena, Montana.

Gamblin, M.S. 1987. Taft-Bell sediment and fishery monitoring project. Progress Report prepared for U.S. Dept. of Energy, Bonneville Power Administration. Contract DE-Al 79-85 BP 23203.

Griffith, J.S. 1972. Comparative behavior and habitat utilization of brook trout (*Salvelinus fontinalis*) and cutthroat trout (*Salmo clarki*) in small streams in northern Idaho. Journal of Fisheries Research Board of Canada. 29:265-273.

Griswold, R.G. and T.C. Bjornn. 1989. Development of indices of yellow perch abundance in Cascade Reservoir, Idaho. Idaho Dept. of Fish and Game. Job Completion Report. Project F-71-R-12 Subproject III Job No. 6. 36 pp.

Hoelshcher, B. and T.C. Bjornn. 1989. Habitat densities and potential production of trout and char in Pend Oreille Lake tributaries. Idaho Dept. of Fish and Game, Job Completion Report, Project F-71-R-10. 60 pp.

Horner, N.J., L.D. LaBolle, and C.A. Robertson. 1987. Regional fisheries management investigations. Idaho Dept. of Fish and Game, Job Performance Report, Project F-71-R-1 1. 151 pp.

Johnson, T.H. and T.C. Bjornn. 1978. Evaluation of angling regulations in management of cutthroat trout. Idaho Dept. of Fish and Game, Job Completion Report, Project F-59-R-7, F-59-R-8. 153 pp.

Kathrein, J.W. 1951. Growth rates of four species of fish in a section of the Missouri River between Holster Dam and Cascade, Montana. Trans. Amer. Fish. Soc. 80:93-98.

Leathe, S.A., and P.J. Graham. 1981. Flathead Lake fish food habits study. Montana Dept. of Fish, Wildl. and Parks. 93 pp.

Lorz, H.W. 1974. Ecology and management of brown trout in the Little Deschutes River. Fish. Res. Rep. Oregon Wildl. Comm. Corvallis, OR. 8:1-49.

Luken, J.R. 1988. Rivers and streams investigations, Snake River game fish populations, fishing pressure and harvest, American Falls Reservoir to South Fork, Job Completion Report, Project F-73-R-10. 44 pp.

Maiolie, M.A. and T. Cochnauer. 1988. Lochsa River literature review. Idaho Dept. of Fish and Game. 38 pp.

Mallet, J.L. 1963. The life histroy and seasonal movements of cutthroat trout in the Salmon River, ID. M.S. Thesis. Univeristy of Idaho, Moscow, ID. 62 pp.

May, B. and J. Huston. 1983. Kootenai River fisheries investigations final report 1972-l 982. Final Completion Report. Montana Dept. of Fish, Wildl. and Parks. 112 pp.

Minshall, G.W. 1981. Structure and temporal variations in the benthic macroinvertebrate community inhabiting Mink Creek, Idaho, USA, a 3rd order Rocky Mountain Stream. J. Freshwater Ecol. 1 :13-26.

Minter, R.F. 1971. Plankton population structure in the lower Coeur d'Alene River, Delta and Lake. M.S. Thesis. University fo Idaho, Moscow, ID. 72 pp.

O'Laughlin, K., M.R. Barber, A.T. Scholz, F. Gibson and M. Weinand. 1988. An instream flow (IFIM) analysis of benthic macroinvertebrates in Chamokane Creek, Spokane Indian Reservation. Upper Columbia United Tribes Fisheries Center, Fisheries Technical Report No. 14. Final Report Submitted to the Bureau of Indian Affairs, Contract No. POOC14208484 317 pp.

Payne, J.M. 1979. Interrelationships between benthic macroinvertebrates and habitat in a mountain stream. M.S. Thesis, Utah State Univ., Logan, UT. 79 pp.

Peone, T. and A.T. Scholz. 1988. Lake Roosevelt monitoring program. Monthly reports submitted to Bonneville Power Administration. Contract DE-81 79-88BP91819.

Peone, T.L., A.T. Scholz, J.R. Griffith, S. Graves and M.G. Thatcher, Jr. 1990. Lake Roosevelt fisheries monitoring program. 1989 Annual Report. Upper Columbia United Tribes Fisheries Center, Dept. of Biology, EWU, Cheney, WA. Prepared for U.S. Dept. of Energy, Bonneville Power Administration, Div. of Fish and Wildl. Project Number 88-63. Agreement DE-81 79-88 B P91819. 234 pp.

Perry, S.A. and J. Huston. 1983. Kootenai River investigations final report 1972-1982, Section A. Mont. Dept. of Fish, Wildl. and Parks in cooperation with the U.S. Army Corps of Engineers. 236 pp.

Perry, S.A. and P.J. Grahm. 1982. The impact of Hungry Horse Dam on the aquatic invertebrates of the Flathead River. Final Report. Montana Department of Fish, Wildlife and Parks in cooperation with the Bureau of Reclamation.

Platts, W.S., W.F. Megahan and G.W. Minshall. 1983. Methods for evaluating stream, riparian and biotic conditions. USDA Forest Service General Technical Report INT-138. 70 pp.

Pratt, K.L. 1985. Pend Oreille trout and char life history study. Idaho Dept. of Fish and Game. 105 pp.

Purkett, C.A., Jr. 1951. Growth rate of trout in relation to elevation and temperature. Trans. Amer. Fish. Soc. 80:251-9.

Reiman, B.E. 1983. Largemouth bass investigations. Idaho Dept. of Fish and Game, Job Completion Report, Project F-3-R-5. 77 pp.

Reiman, B.E. and B. Bowler. 1980. Kokanee trophic ecology and limnology in Pend Oreille Lake. Idaho Dept. of Fish and Game. No. 1. 27 pp.

Reiman, B.E. 1976. Limnology of Pend Oreille Lake, Idaho, with emphasis on the macro-zooplankton community. M.S. Thesis. Univeristy of Idaho, Moscow, ID. 117 pp.

Ricker, W.E. 1975. Computation and interpretation of biological statistics of fish populations. Bull. Fish. Res. Bd. Can. 191:382 pp.

Schaefer, W.F. 1977. Growth patterns, food habits and seasonal distributions of yellow perch in south western Lake Michigan. Trans. Wis. Acad. Sci., Arts, Lett. 65:204-216.

Schill, D.J. and J.T. Heimer. 1988. Regional fisheries management investigations, Idaho Department of Fish and Game. Job Performance Report, Project F-71-R-12. 105 pp.

Scholz, A.T., K. O'Laughlin, T. Peone, J. Uehara, T. Kleist, and J. Hisata. 1988. Environmental factors affecting kokanee salmon, *Oncorhynchus nerka* (Walbaum) in Deer and Loon Lakes, Stevens County, Washington. Final report submitted to Deer Lake Property Owners Association, Loon Lake Property Owners Association and Washington State Department of Wildlife. June 1988. 167 pp.

Scholz, A.T., T. Peone, M.R. Barber, J.K. Uehara, and D.R. Geist. 1988. Rainbow trout, brown trout, brook trout, mountain whitefish, piute sculpin, and torrent sculpin population and production estimates for Chamokane Creek, Spokane Indian Reservation, in 1986 and 1987. Upper Columbia United Tribes Fisheries Center, Fisheries Technical Report No. 11. Final Report Submitted to the Bureau of Indian Affairs, Contract No. POOC14208484. 78 pp.

Seber, G.A. F. and E.D. LeCren. 1967. Estimating population parameters from catches large relative to the population. J. Anim. Ecol. 36:631-643.

Uehara, J., T. Peone, A. Scholz, M. Barber. 1988. Growth rates of brown trout and rainbow trout in Chamokane Creek in comparison to other trout streams in the Pacific Northwest. Upper Columbia United Tribes Fishery Center, Fisheries Technical Report No. 16. Final Report Submitted to the Bureau of Indian Affairs, Contract No. POOC14208484. 32 pp.

Washington Department of Wildlife. Creel census, stocking records, and fish survey reports. On file at Region No. 1 office, Spokane, WA.

Willms, R.A., A.T. Scholz, and J. Whalen. 1989. The assessment of a developing mixed-species fishery in Sprague Lake, Adams and Lincoln Counties, Washington, following restoration with rotenone. Dept. of Biology, Eastern Washington University, Cheney, WA. 160 pp.

Wydoski, R.S. and R.R. Whitney. 1979. Inland fishes of Washington. University of Washington Press, Seattle, WA. 220 pp.

Zippin, C. 1958. The removal method of population estimation. J. Wildl. Manage. 22:82-90.

ASSESSMENT OF THE FISHERY IMPROVEMENT OPPORTUNITIES ON THE PEND OREILLE RIVER

APPENDICES FOR 1989 ANNUAL REPORT

By:

Michael R. Barber
Becky L. Renberg
John J. Vella
Allan T. Scholz
Kelly L. Woodward
and
Suzy Graves

Upper Columbia United Tribes Fisheries Center
Department of Biology
Eastern Washington University

Prepared for:

Fred Holm
Project Manager
U.S. Department of Energy
Bonneville Power Adimistration
Division of Fish and Wildlife
Project Number 88-66
Agreement DE-1 79-88BP39339

October, 1990

TABLE OF CONTENTS

APPENDIX A

MONTHLY **ELECTROFISHING, GILLNETTING,** AND BEACH SEINING RELATIVE ABUNDANCE DATA FOR EACH FISH SPECIES

Table **A.1.** Number of each species of fish caught by **electrofishing** at each **Pend Oreille** River study site in November, **1988.**

STUDY SITE	1	2	3	3A	4	4A	5	5A	6	6A	7	8	9	10	11	11A	TOTAL
SHOCK TIME (MIN)	29	20	30	20	30	20	30	35	30	30	40	20	10	40	30	6	420
BULL TROUT																	
CUTTHROAT TROUT																	
BROWN TROUT		5		2													7
BROOK TROUT		1															1
RAINBOW TROUT		2															2
KOKANEE																	
MOUNTAIN WHITEFISH		1	3	4			4	1	1		1	1	4	19	5		44
LARGEMOUTH BASS	6	7	1			3	2	35			5	14		24		1	98
BLACK CRAPPIE	1				1	1		2				2		2	1	5	15
PUMPKINSEED	3	2	23	5	4	7	15	63	7	39	24	8	2	30	10	27	269
YELLOW PERCH	27	31	45	10	13	35	18	153	30	65	76	18	15	63	23	4	626
LONGNOSE SUCKER	1	3	1	10	1	2	1	4	2	3	3	6	12	9	2		60
LARGESCALE SUCKER	10	25	2	1			1		3	2	2	4	1	11	1	1	64
BROWN BULLHEAD	2	1	5	1	1	2		4	1	1	1	1		3	1		24
TENCH	1	5	6	11	5	25	6	45	11	8	16	6	3	37	3	8	196
NORTHERN SQUAWFISH	20	29	1	1	1	4	1	2	6		6	13	7	3	12		106
PEAMOUTH	1											1				2	4
REDSIDE SHINER	1																1
SCULPIN		1															1
TOTAL	73	113	87	45	26	79	48	309	61	118	134	74	44	201	58	48	1518

Table **A.2.** Percent of each species of fish caught by **electrofishing** at each study site in the **Pend Oreille** River during November, **1988.**

STUDY SITE	1	2	3	3A	4	4A	5	5A	6	6A	7	8	9	10	11	11A	TOTAL
BULL TROUT																	
CUTTHROAT TROUT																	
BROWN TROUT		4.4		4 4													0.5
BROOK TROUT		0.9															0.1
RAINBOW TROUT		1.8															0.1
KOKANEE																	
MOUNTAIN WHITEFISH		0.9	3.4	8.8			8.3	0.3	1.6		0.7	1.4	9.0	9.4	8.6		2.9
LARGEMOUTH BASS	8.2	6.2	1.1			3.8	4.2	11.3			3.7	18.9		11.9		2.1	6.5
BLACK CRAPPIE	1.4				3.8	1.3		0.6				2.7		0.9	1.7	10.4	0.9
PUMPKINSEED	4.1	1.8	26.4	11.1	15.4	8.9	31.3	20.4	11.5	33.1	17.9	10.8	4.5	14.9	17.2	56.3	17.7
YELLOW PERCH	36.9	27.4	51.7	22.2	50.0	44.3	37.5	49.5	49.2	55.1	56.7	24.3	34.1	31.3	39.6	8.3	41.2
LONGNOSE SUCKER	1.4	2.7	1.1	11.1	3.8	2.5	2.1	1.3	3.3	2.5	2.2	8.1	27.3	4.5	3.4		3 9
LARGESCALE SUCKER	13.7	22.1	2.3	2.2			2.1		4.9	1.7	1.5	5.4	2.3	5.5	1.7	2.1	4.2
BROWN BULLHEAD	2.7	0.9	5.7	2.2	3.8	2.5		1.3	1.6	0.8	0.7	1.4		1.5	1.7		1.6
TENCH	1.4	4.4	6.9	24.4	19.2	31.6	12.5	14.6	18.0	6.7	11.9	8.1	6.8	18.4	5.2	16.7	12.9
NORTHERN SQUAWFISH	27.4	25.7	1.1	2.2	3.8	5.1	2.1	0.6	9.8		4.5	17.6	15.9	1.5	20.7	4.2	7.0
PEAMOUTH	1.4											1.4					0.3
REDSIDE SHINER	1.4																0.1
SCULPIN		0.9															0.1

Table **A.3.** Number of each species of **fish** caught by **electrofishing** at each **Pend Oreille** River study site in December, **1988.**

STUDY SITE	1	2	3	4	4A	5	6	7	8	9	10	TOTAL
SHOCK TIME (MIN)	54	35	30	30	9	29	29	30	40	30	20	336
RBT x CTT HYBRID	1											1
BULL TROUT												
CUTTHROAT TROUT	1					3	1					4
BROWN TROUT	3	1				1	1			1		7
BROOK TROUT												
RAINBOW TROUT												
KOKANEE												
MOUNTAIN WHITEFISH	1		8	10	1	5	4	8	4	1	4	46
LARGEMOUTH BASS	3		4		7	2		2	15	1	14	48
BLACK CRAPPIE	4		6						4			14
PUMPKINSEED	14		63	3	2	2	1	3	2	2	3	95
YELLOW PERCH	16	9	85	65	9	70	54	7	7	15	17	354
LONGNOSE SUCKER		1	2	5		2	4	2	3	5	7	31
LARGESCALE SUCKER	5		1	6		8	6	1	3		2	32
BROWN BULLHEAD	3		4	9		4			1		1	22
TENCH	4		11	10	15	9	2	3	4	2	8	68
NORTHERN SQUAWFISH	5	5	4	2	6	2	2		3	7	10	46
PEAMOUTH	1						1					2
REDSIDE SHINER												
SCULPIN		3										3
TOTAL	60	19	188	110	40	108	76	26	46	34	66	773

Table **A.4.** Percent of each species of fish caught by **electrofishing** at each **Pend Oreille** River study site in December, **1988.**

STUDY SITE	1	2	3	4	4A	5	6	7	8	9	10	TOTAL
RBT x CTT HYBRID	1.6											0.1
(BULL TROUT												
CUTTHROAT TROUT						2.7	1.3					0.5
BROWN TROUT	5.0	5.3				0.9	1.3			2.9		0.9
BROOK TROUT												
RAINBOW TROUT												
MOUNTAIN WHITEFSIH	1.6		4.3	9.0	2.5	4.6		30.7	8.7	2.9	6.1	5.9
LARGEMOUTH BASS	5.0		2.1		17.5	1.8	5.3	7.7	32.6	2.9	21.2	6.2
BLACK CRAPPIE	6.6		3.2						8.7			1.8
PUMPKINSEED	23.0		33.5	2.7	5.0	1.8	1.3	11.5	4.3	5.9	4.5	12.3
YELLOW PERCH	26.7	47.4	45.2	59.0	22.5	64.8	71.1	26.9	15.2	44.1	25.7	45.8
LONGNOSE SUCKER		5.3	1.1	4.5		1.8	5.3	7.7	6.5	14.7	10.6	4.0
LARGESCALE SUCKER	8.3		0.5	5.4		7.4	7.9	3.8	6.5		3.0	4.1
BROWN BULLHEAD	5.0		2.1	8.2		3.7			2.2		1.5	2.8
TENCH	6.6		5.8	9.0	37.5	8.3	2.6	11.5	8.7	5.9	12.1	8.8
NORTHERN SQUAWFISH	8.3	26.3	2.1	1.8	15.0	1.8	2.6		6.5	20.6	15.2	5.9
PEAMOUTH	1.6						1.3					0.2
REDSIDE SHINER												
SCULPIN		15.8										0.4

Table **A.5.** Number of each species of fish caught by **electrofishing** at each **Pend Oreille** River study site in January, **1989.**

STUDY SITE	2	3	4	5	6	7	8	9	10	11	TOTAL
SHOCK TIME (MIN)	43	63	40	52	42	31	30	31	30	55	417
BULL TROUT											
CUTTHROAT TROUT		1									1
BROWN TROUT	2										2
BROOK TROUT											
RAINBOW TROUT											
KOKANEE											
MOUNTAIN WHITEFISH	4	2	10	4	1	1		3	18	8	51
LARGEMOUTH BASS	3	3	10	2	2	6	4	1		1	32
BLACK CRAPPIE		1	1			8				1	11
PUMPKINSEED	4	15	41	11	2	4	14	1	2	14	108
YELLOW PERCH	5	1	33	2		4		2		6	53
LONGNOSE SICKER	2	4	6			9	6	4	1	1	33
LARGESCALE SUCKER	3	8	10	12	3	8	3		2	2	51
BROWN BULLHEAD		1	7			4				1	13
TENCH	2	6	17	2		15	2	1	4	3	52
NORTHERN SQUAWFISH	20	1					1			2	24
PEAMOUTH											
REDSIDE SHINER											
SCULPIN	6									1	7
TOTAL	51	43	135	33	8	59	30	12	27	40	438

Table **A.6.** Percent of each species of fish caught by **electrofishing** at each **Pend Oreille** River study site in January, **1989.**

STUDY SITE	2	3	4	5	6	7	8	9	10	11	Total
BULL TROUT											
CUTTHROAT TROUT		2.3									0.2
BROWN TROUT	3.9										0.5
BROOK TROUT											
RAINBOW TROUT											
KOKANEE											
MOUNTAIN WHITEFISH	7.8	4 .6	7.4	12.1	12.5	1.7		25.0	66.7	20.0	11.6
LARGEMOUTH BASS	6.0	7.0	7.4	6.1	25.0	10.2	13.3	8.3		2.5	7.3
BLACK CRAPPIE		2.3	0.7			13.6				2.5	2.5
PUMPKINSEED	7.8	34.9	30.4	33.3	25.0	6.8	46.7	8.3	7.4	35.0	24.7
YELLOW PERCH	9.8	2.3	24.4	6.1		6.8		16.6		15.0	12.1
LONGNOSE SUCKER	3.9	9.3	4.4			15.2	20.0	33.3	3.7	2.5	7.5
LARGESCALE SUCKER	6.0	18.6	7.4	36.4	37.5	10.2	10.0		7.4	5.0	11.6
BROWN BULLHEAD		2.3	5.2			6.8				2.5	3.0
TENCH	3.9	14.0	12.6	6.1		25.4	6.7	8.3	14.8	7.5	11.9
NORTHERN SQUAWFISH	39.2	2.3					3.3			5.0	5.5
PEAMOUTH											
REDSIDE SHINER											
SCULPIN	11.8									2.5	1.6

Table **A.7.** Number of each species of fish caught by **electrofishing** at each **Pend Oreille** River study site in March, **1989.**

STUDY SITE	1	2	3	4	5	6	6A	7	8	8A	9	10	11	Total
SHOCK TIME (MIN)	20	30	32	30	31	30	10	30	27	10	30	26	29	335
BULL TROUT														
CUTTHROAT TROUT											2			2
BROWN TROUT	1	1			1			2	1					6
BROOK TROUT														
RAINBOW TROUT		1												1
KOKANEE		1												1
MOUNTAIN WHITEFISH	3	7	7	11	34	33	11	15	14		32	31	12	210
LARGEMOUTH BASS	1		4	7					11					23
BLACK CRAPPIE				1					1					2
PUMPKINSEED						1							3	4
YELLOW PERCH	2			2			9						1	14
LONGNOSE SUCKER	1	1	2	4		2		1	9	2	2	1	2	27
LARGESCALE SUCKER	8	13	5	4	3	8	1	3	2	7	4	3	3	64
BROWN BULLHEAD	1		2	15	1									19
TENCH	1	1	7	3	1		1		1			4		19
NORTHERN SQUAWFISH		1				1	2	1						5
PEAMOUTH								2			1			3
REDSIDE SHINER														
SCULPIN														
TOTAL	18	26	27	47	40	45	24	24	39	9	41	39	21	400

Table **A.8.** Percent of each species of fish caught by **electrofishing** at each study site in the **Pend Oreille** River in March, **1989.**

STUDY SITE	1	2	3	4	5	6	6A	7	8	8A	9	10	11	TOTAL
BULL TROUT														
CUTTHROAT TROUT											4.9			0.5
BROWN TROUT	5.5	7.7			2.5			8.3	2.6					1.5
BROOK TROUT														
RAINBOW TROUT		7.7												0.3
KOKANEE		7.7												0.3
MOUNTAIN WHITEFISH	16.7	26.9	25.9	23.4	85.0	73.3	45.8	62.5	35.9		78.0	79.4	57.1	52.5
LARGEMOUTH BASS	5.5		14.8	14.9					28.2					5.8
BLACK CRAPPIE				2.1					2.6					0.5
PUMPKINSEED						2.2							14.3	1.0
YELLOW PERCH	11.1			4.2			37.5						4.8	3.5
LONGNOSE SUCKER	5.5	7.7	7.4	8.5		4.4		4.2	23.1	22.2	4.9	2.6	9.5	6.8
LARGESCALE SUCKER	44.4	50.0	18.5	8.5	7.5	17.8	4.2	12.5	5.1	77.8	9.8	7.7	14.3	16.0
BROWN BULLHEAD	5.5		7.4	31.9	2.5									4.8
TENCH	5.5	7.7	25.9	6.4	2.5	2.2	4.2		2.6			10.3		4.8
NORTHERN SQUAWFISH		7.7					8.3	4.2						1 3
PEAMOUTH								8.3			2.5			0 8
REDSIDE SHINER														
SCULPIN														

Table **A.9.** Number of each fish species caught by **electrofishing** at each **Pend Oreille** River study site in April, **1989.**

STUDY SITE	1	2	3	3A	4	4A	5	5A	6	6A	7	8	8C	9	10	11	TOTAL
SHOCK TIME (MIN)	30	28	30	31	30	59	33	36	30	20	33	30	33	31	26	26	506
BULL TROUT																	
CUTTHROAT TROUT	2								1								3
BROWN TROUT	1	2					1		1		3	1				2	11
BROOK TROUT																	
RAINBOW TROUT																	
KOKANEE		1															1
MOUNTAIN WHITEFISH	7	41	2	3	8	1	5		10	19	4	5	2	4	9	39	159
LARGEMOUTH BASS	6	2	3		1	29	1	29		2	4	2	9				88
BLACK CRAPPIE						51		1					5			1	58
PUMPKINSEED	1	2	1		1	60	4	8	3		18	7	20	1	2		128
YELLOW PERCH	10	1	10		32	771	88	229	20	7	43	26	113	63	83	57	1553
LONGNOSE SUCKER	1	6	3	3	1	1	1	1	1	4			30			4	56
LARGESCALE SUCKER	30	72	3		1		4	1		4	4	1	5	1	9	7	142
BROWN BULLHEAD						7		1					18				26
TENCH	1		1			36	1	2	1	3	6	3	46			1	101
NORTHERN SQUAWFISH	5	5	4		2	1					3		3			7	30
PEAMOUTH	1	3			1	2			1		1		6		1		16
REDSIDE SHINER																	
SCULPIN																	
TOTAL	65	135	27	6	47	959	105	272	38	39	86	45	257	69	104	118	2372

Table **A.10.** Percent of each species of fish caught by **electrofishing** at each study site in the **Pend Oreille** River in April, **1989.**

STUDY SITE	1	2	3	3A	4	4A	5	5A	6	6A	7	8	8C	9	10	11	TOTAL
BULL TROUT																	
CUTTHROAT TROUT	3.1								2.6								0.1
BROWN TROUT	1.5	1.5					1.0		2.6		3.5	2.2				1.7	0.5
BROOK TROUT																	
RAINBOW TROUT																	
KOKANEE		0.7															0.04
MOUNTAIN WHITEFISH	10.8	30.4	7.4	50.0	17.0	0.1	4.8		26.3	48.7	4.6	11.1	0.8	5.8	8.6	33.0	6.7
LARGEMOUTH BASS	9.2	1.5	11.1		2.1	3.0	1.0	10.7		5.1	4.6	4.4	3.5				3.7
BLACK CRAPPIE						5.3		0.4					2.0			0.8	2.4
PUMPKINSEED	1.5	1.5	3.7		2.1	6.3	3.8	2.9	7.9		20.9	15.6	7.8	1.4	1.9		5.4
YELLOW PERCH	15.4	0.7	37.0		68.1	80.4	83.8	84.2	52.6	18.0	50.0	57.8	44.0	91.3	79.8	48.3	65.5
LONGNOSE SUCKER	1.5	4.4	11.1	50.0	2.1	0.1	1.0	0.4	2.6	10.3			11.7			3.4	2.4
LARGESCALE SUCKER	46.1	53.3	11.1		2.1		3.8	0.4		10.3	4.6	2.2	2.0	1.4	8.6	5.9	6.0
BROWN BULLHEAD						0.7		0.4					7.0				1.1
TENCH	1.5		3.7			3.8	1.0	0.7	2.6	7.7	7.0	6.7	17.9			0.8	4.3
NORTHERN SQUAWFISH	7.7	3.7	14.8		4.3	0.1					3.5		1.2			5.9	1.3
PEAMOUTH	1.5	2.2			2.1	0.2			2.6		1.2		2.3		1.0		0.7
REDSIDE SHINER																	
SCULPIN																	

Table **A.11.** Number of each fish species caught by **electrofishing** at each **Pend Oreille** River study site in May, **1989.**

STUDY SITE	1	2	3	3A	4	4A	5	5A	6	6A	7	8	9	10	11	TOTAL
SHOCK TIME (MIN)	28	25	30	31	30	30	30	30	30	30	30	30	30	30	27	441
BULL TROUT																
CUTTHROAT TROUT	1	1						1				2				5
BROWN TROUT	2	3					2	2	2	1	4	2	6	4		28
BROOK TROUT																
RAINBOW TROUT	3														1	4
KOKANEE			1			1		3								5
MOUNTAIN WHITEFISH	5	20	1	3	1	1	6	1	15	41	2	2	11	17	37	163
LARGEMOUTH BASS	2	5	1	2	6	26	1	18	4	1	12	10	11	1	2	102
BLACK CRAPPIE		1	1			1		8								11
PUMPKINSEED	3	3			10	18	1	22	14	7	22	6	17	15	80	218
YELLOW PERCH	4	16	7	47	30	65	15	38	15	8	62	14	43	30	34	428
LONGNOSE SUCKER			4	12	5	5	1	1	4	6		1	2	1	1	43
LARGESCALE SUCKER	3	6	3	1	6		10	3	1	8	4	8	6	4	6	69
BROWN BULLHEAD		1		1	2			1								5
TENCH	1	5		2	1	6		8		5	4	3	12	22	7	76
NORTHERN SQUAWFISH	8	2	4				1	1	1	1	2	3	3	2	3	31
PEAMOUTH			2		1	1						2				6
REDSIDE SHINER																
SCULPIN																
TOTAL	32	63	24	68	62	124	37	107	56	78	112	53	111	96	171	1194

Table **A.12.** Percent of each species of fish caught by **electrofishing** at each study site in the **Pend Oreille** River in May, **1989.**

STUDY SITE	1	2	3	3A	4	4A	5	5A	6	6A	7	8	9	10	11	TOTAL
BULL TROUT																
CUTTHROAT TROUT	3.1	1.6						0.9				3.8				0.4
BROWN TROUT	6.2	4.8					5.4	1.9	3.6	1.3	3.6	3.8	5.4	4.2		2.4
BROOK TROUT																
RAINBOW TROUT	9.4														0.6	0.3
KOKANEE			4.2			0.8		2.8								0.4
MOUNTAIN WHITEFISH	15.6	31.7	4.2	4.4	1.6	0.8	16.2	0.9	26.8	52.6	1.8	3.8	9.9	17.7	21.6	13.6
LARGEMOUTH BASS	6.2	7.9	4.2	2.9	9.7	21.0	2.7	16.8	7.1	1.3	10.7	18.9	9.9	1.0	1.2	8.5
BLACK CRAPPIE		1.6	4.2			0.8		7.5								0.9
PUMPKINSEED	9.4	4.8			16.1	14.5	2.7	20.6	25.0	9.0	19.6	11.3	15.3	15.6	46.8	18.3
YELLOW PERCH	12.5	25.4	29.2	69.1	48.4	52.4	40.5	35.5	26.8	10.3	55.4	26.4	38.7	31.2	19.9	35.8
LONGNOSE SUCKER			16.7	17.6	8.1	4.0	2.7	0.9	7.1	7.7		1.9	1.8	1.0	0.6	3.6
LARGESCALE SUCKER	9.4	9.5	12.5	1.5	9.7		27.0	2.8	1.8	10.3	3.6	15.1	5.4	4.2	3.5	5.8
BROWN BULLHEAD		1.6		1.5	3.2			0.9								0.4
TENCH	3.1	7.9		2.9	1.6	4.8		7.5		6.4	3.6	5.7	10.8	22.9	4.1	6.4
NORTHERN SQUAWFISH	25.0	3.2	16.7				2.7	0.9	1.8	1.3	1.8	5.7	2.7	2.1	1.7	2.6
PEAMOUTH			8.3		1.6	0.8						3.8				0.5
REDSIDE SHINER																
SCULPIN																

Table **A.13.** Number of each species of fish caught by **electrofishing** at each study site in June, **1989.**

STUDY SITE	1	2	2B	3	3A	4	4A	5	5A	6	6A	7	8	9	10	11	TOTAL
SHOCK TIME (MIN)	30	61	37	30	30	30	31	30	30	30	27	30	30	30	30	32	518
BULL TROUT																	
CUTTHROAT TROUT																	
BROWN TROUT		2			1						1	1			1	1	7
BROOK TROUT		1															1
RAINBOW TROUT		1									1						2
KOKANEE					1											1	2
MOUNTAIN WHITEFISH	2	35						1		3			8		1	16	66
LARGEMOUTH BASS	25	41	51	5	9	3	28	20	81	7	12	11	3	31	3	3	333
BLACK CRAPPIE	1	2	19		4		7		5					1			39
PUMPKINSEED	6	11	30	6	16	1	42	137	443	13	30	18	2	24	23	22	824
YELLOW PERCH	37	120	101	24	50	3	102	189	262	87	134	46	13	67	125	56	1416
LONGNOSE SUCKER				1	15	2	2	1			5	1		1	1	12	41
LARGESCALE SUCKER	19	42	2	13	7	4	2	1	1	3		9	11	5		4	123
BROWN BULLHEAD	3	1	8	7			2		8	1	1					1	32
TENCH		7	50	9	12	9	25	13	14	17	24	4	1	8	7	10	210
NORTHERN SQUAWFISH	31	21		2			2		1		3	1	1	1	9	26	98
PEAMOUTH		1							2							2	5
REDSIDE SHINER																	
SCULPIN																	
TOTAL	124	285	261	67	115	22	212	362	817	131	211	91	39	138	170	154	3199

Table **A.14.** Percent of each species of fish caught by **electrofishing** at each study site in June, **1989.**

STUDY SITE	1	2	2B	3	3A	4	4A	5	5A	6	6A	7	8	9	10	11	TOTAL
BULL TROUT																	
CUTTHROAT TROUT																	
BROWN TROUT		0.7			0.9						0.5	1.1			0.6	0.7	0.2
BROOK TROUT		0.4															0.03
RAINBOW TROUT		0.4									0.5						0.1
KOKANEE					0.9											0.7	0.1
MOUNTAIN WHITEFISH	1.6	12.3						0.3		2.3			20.5		0.6	10.4	2.1
LARGEMOUTH BASS	20.2	14.4	19.5	7.5	7.8	13.6	13.2	5.5	9.9	5.3	5.7	12.1	7.7	22.5	1.8	1.9	10.4
BLACK CRAPPIE	0.8	0.7	7.3		3.5		3.3		0.6					0.7			1.2
PUMPKINSEED	4.8	3.9	11.5	9.0	13.9	4.6	19.8	37.8	54.2	9.9	14.2	19.8	5.1	17.4	13.5	14.3	25.8
YELLOW PERCH	29.8	42.1	38.7	35.8	43.5	13.6	48.1	52.2	32.1	66.4	63.5	50.5	33.3	48.5	73.5	36.4	44.3
LONGNOSE SUCKER				1.5	13.0	9.1	0.9	0.3			2.4	1.1		0.7	0.6	7.8	1.3
LARGESCALE SUCKER	15.3	14.7	0.8	19.4	6.1	18.2	0.9	0.3	0.1	2.3		9.9	28.2	3.6		2.6	3.8
BROWN BULLHEAD	2.4	0.4	3.1	10.5			0.9		1.0	0.8	0.5					0.7	1.0
TENCH		2.5	19.2	13.4	10.4	40.9	11.8	3.6	1.7	13.0	11.4	4.4	2.6	5.8	4.1	6.5	6.6
NORTHERN SQUAWFISH	25.0	7.4		3.0			0.9		0.1		1.4	1.1	2.6	0.7	5.3	16.9	3.1
PEAMOUTH		0.4							0.2							1.3	0.2
REDSIDE SHINER																	
SCULPIN																	

Table A.15. Number of each species of fish caught by electrofishing at each Pend Oreille River study site in July, 1989.

STUDY SITE	1	1A	1C	2	2B	2D	2E	3	3A	4	4A	5	5A	6	6A	7	8	9	10	11	TOTAL
SHOCK TIME (MIN)	31	9	8	40	10	5	8	30	30	30	20	30	11	30	30	30	28	30	16	10	436
LAKE TROUT				2																	2
RBT X CTT HYBRID				2																	2
BULL TROUT																					
CUTTHROAT TROUT																					
BROWN TROUT		1	1	7					5							1					15
BROOK TROUT																					
RAINBOW TROUT				2																	2
KOKANEE																					
MOUNTAIN WHITEFISH		2	2	110		2			6			1		1							124
LARGEMOUTH BASS	1	3	5	4	7	1	5	2	2	2	5	7	14	6	51	5	3	22	11		156
BLACK CRAPPIE		1		2				1	1		5	1					1	3	2		17
PUMPKINSEED		3	2	2	6	2	4	4	6	2	12	41	11	22	127	19	4	13	5		285
YELLOW PERCH	7	7	15	14	20	12	14	59	52	85	76	126	12	42	68	37	101	105	72	4	928
LONGNOSE SUCKER		1		5		1	2	2	19	1						1	3	2	4		41
LARGESCALE SUCKER	14	23	8	13	2	2	1	2	6	3	1	2					1	3			81
BROWN BULLHEAD				3		2	2			1		3			1	1		1	1		15
TENCH	4		1	6			7	5	2	10	12	26	3	12	19	5	10	16	27	1	166
NORTHERN SQUAWFISH	12	5	9	6	9		3		7	1	4	1			1			1	1		60
PEAMOUTH		5		2				1	8									1			17
REDSIDE SHINER																					
SCULPIN																					
TOTAL	38	51	43	180	44	22	38	76	114	105	115	208	40	83	267	69	123	167	123	5	1911

Table A.16. Percent of each species of fish caught by electrofishing at each Pend Oreille River study site in July, 1989.

STUDY SITE	1	1A	1C	2	2B	2D	2E	3	3A	4	4A	5	5A	6	6A	7	8	9	10	11	TOTAL
LAKE TROUT				1.1																	0.1
RBT X CTT HYBRID				1.1																	0.1
BULL TROUT																					
CUTTHROAT TROUT																					
BROWN TROUT		2.0	2.3	3.9					4.4							1.4					0.8
BROOK TROUT																					
RAINBOW TROUT				1.1																	0.1
KOKANEE																					
MOUNTAIN WHITEFISH		3.9	4.6	61.1		9.1			5.3			0.5		1.2							6.5
LARGEMOUTH BASS	2.6	5.9	11.6	2.2	15.9	4.5	13.2	2.6	1.7	1.9	4.3	3.4	35.0	7.2	19.1	7.2	2.4	13.2	8.9		8.2
BLACK CRAPPIE		2.0		1.1				1.3	0.9		4.4	0.5					0.8	1.8	1.6		0.9
PUMPKINSEED		5.9	4.6	1.1	13.6	9.1	10.5	5.3	5.3	1.9	10.4	19.7	27.5	26.5	47.6	27.5	3.2	7.8	4.1		14.9
YELLOW PERCH	18.4	13.7	34.8	7.8	45.4	54.5	36.8	77.6	45.6	80.9	66.1	60.6	30.0	50.6	25.5	53.6	82.1	62.9	58.5	80.0	48.6
LONGNOSE SUCKER		2.0		2.8		4.5	5.3	2.6	16.7	0.9						1.4	2.4	1.2	3.2		2.1
LARGESCALE SUCKER	36.8	45.1	18.6	7.2	4.5	9.1	2.6	2.6	5.3	2.9	0.9	1.0					0.8	1.8			4.2
BROWN BULLHEAD				1.7		9.1	5.3			0.9		1.4			0.4	1.4		0.6	0.8		0.8
TENCH	10.5		2.3	3.3			18.4	6.6	1.7	9.5	10.4	12.5	7.5	14.5	7.1	7.2	8.1	9.6	21.9	20.0	8.7
NORTHERN SQUAWFISH	31.6	9.8	20.9	3.3	20.4		7.9		6.1	0.9	3.5	0.5			0.4			0.6	0.8		3.1
PEAMOUTH		9.8		1.1				1.3	7.0									0.6			0.9
REDSIDE SHINER																					
SCULPIN																					

Table **A.17.** Number of each species of fish caught by **electrofishing** at each **Pend Oreille** River study sites in August, **1989.**

STUDY SITE	1	2	3	3A	4	4A	5	5A	6	7	8	9	10	11	TOTAL
SHOCK TIME (MIN)	30	30	10	30	30	20	30	20	30	30	30	30	27	40	387
BULL TROUT															
CUTTHROAT TROUT															
BROWN TROUT		2		12							4				18
BROOK TROUT															
RAINBOW TROUT				1											1
KOKANEE				1											1
MOUNTAIN WHITEFISH		2	1	21							1	2	1	1	29
LARGEMOUTH BASS	5	4	18	3	13	32	19	51	10	11	7	14	10	10	207
BLACK CRAPPIE				1		9		1		1		1	1	1	15
PUMPKINSEED	2	4	27	6	27	52	18	34	23	18	7	5	10	25	258
YELLOW PERCH	17	46	39	39	93	90	70	42	74	64	67	55	52	45	793
LONGNOSE SUCKER			2	46	1		1				2	2	2		56
LARGESCALE SUCKER	5	8	1	13	1	3	6			1		5	2	3	48
BROWN BULLHEAD		1	1	1	1	1	1	2					1	2	11
TENCH	1	11	4	8	7	17	4	5	14	5	13	11	7	21	128
NORTHERN SQUAWFISH	6	21	2	5	1	2			1	4	1	5	2	7	57
PEAMOUTH				2											2
REDSIDE SHINER	1														1
SCULPIN															
TOTAL	37	99	95	159	144	206	119	135	122	104	102	100	88	115	1625

Table **A.18.** Percent of each species of fish caught by **electrofishing** at each study site in the **Pend Oreille** River during August, **1989.**

STUDY SITE	1	2	3	3A	4	4A	5	5A	6	7	8	9	10	11	TOTAL
BULL TROUT															
CUTTHROAT TROUT															
BROWN TROUT		2.0		7.5							3.9				1.1
BROOK TROUT															
RAINBOW TROUT				0.6											0.1
KOKANEE				0.6											0.1
MOUNTAIN WHITEFISH		2.0	1.1	13.2							1	2	1.1	0.9	1.8
LARGEMOUTH BASS	13.5	4.0	18.9	1.9	9.0	15.5	16.0	37.8	8.2	10.6	6.9	14	11.4	8.7	12.7
BLACK CRAPPIE				0.6		4.4		0.7		1.0		1.0	1.1	0.9	0.9
PUMPKINSEED	5.4	4.0	28.4	3.8	18.8	25.2	15.1	25.2	18.9	17.3	6.9	5.0	11.4	21.7	15.9
															0
YELLOW PERCH	45.9	46.5	41.1	24.5	64.6	43.7	58.8	31.1	60.7	61.5	65.7	55	59.1	39.1	48.8
LONGNOSE SUCKER			2.1	28.9	0.7		0.8				2.0	2.0	2.3		3.4
LARGESCALE SUCKER	13.5	8.1	1.1	8.2	0.7	1.5	5.0			1.0		5.0	2.3	2.6	3.0
BROWN BULLHEAD		1.0	1.1	0.6	0.7	0.5	0.8	1.5					1.1	1.7	0.7
TENCH	2.7	11.1	4.2	5.0	4.9	8.3	3.4	3.7	11.5	4.8	12.7	11.0	8.0	18.3	7.9
NORTHERN SQUAWFISH	16.2	21.2	2.1	3.1	0.7	1.0			0.8	3.8	1.0	5.0	2.3	6.1	3.5
PEAMOUTH				1.3											0.1
REDSIDE SHINER	2.7														0.1
SCULPIN															

Table A.19. Number of each species of fish caught by electrofishing at each Pend Oreille River study sites in September, 1989.

STUDY SITE	1	2	3	3A	4	4A	5	5A	6	6A	7	8	8A	9	10	11	TOTAL
SHOCK TIME (MIN)	30	30	30	30	30	30	30	20	30	30	30	20	10	30	30	30	440
BULL TROUT				1									1				2
CUTTHROAT TROUT																	
BROWN TROUT				11									1			1	13
BROOK TROUT																	
RAINBOW TROUT																	
KOKANEE				1													1
MOUNTAIN WHITEFISH		3		12													15
LARGEMOUTH BASS	3		10	1	16	41	11	53	22	22	23	16	2	2	18	10	250
BLACK CRAPPIE	3		1	13	2	8		3			2			1			33
PUMPKINSEED		4	27	22	37	60	16	12	20	87	26	32	12	30	11	10	406
YELLOW PERCH	11	7	100	39	81	146	39	28	35	25	57	86	20	66	36	9	785
LONGNOSE SUCKER		1		11		4	1	2		2		1	15		3	1	41
LARGESCALE SUCKER	2	8		14	3	4	2					1	3	1		1	39
BROWN BULLHEAD			1	4	3	3				3		1		1	1	2	19
TENCH		5	11	5	26	17	13	7	9	10	17	7	2	13	20	10	172
NORTHERN SQUAWFISH	12	6	1	4	1	2		1					8		3		38
PEAMOUTH																	
REDSIDE SHINER																	
SCULPIN																	
TOTAL	31	34	151	138	169	285	82	106	86	149	125	144	64	114	92	44	1814

Table A.20. Percent of each species of fish caught by electrofishing at each study site in the Pend Oreille River during September, 1989.

STUDY SITE	1	2	3	3A	4	4A	5	5A	6	6A	7	6	8A	9	10	11	TOTAL
BULL TROUT				0.7									1.6				0.1
CUTTHROAT TROUT																	
BROWN TROUT				8.0									1.6			2.3	0.7
BROOK TROUT																	
RAINBOW TROUT																	
KOKANEE				0.7													0.1
MOUNTAIN WHITEFISH		8.8		8.7													0.8
LARGEMOUTH BASS	9.7		6.6	0.7	9.5	14.4	13.4	50.0	25.6	14.8	18.4	11.1	3.1	1.8	19.6	22.7	13.8
BLACK CRAPPIE	9.7		0.7	9.4	1.2	2.8		2.8			1.6			0.9			1.8
PUMPKINSEED		11.8	17.9	15.9	21.9	21.1	19.5	11.3	23.3	58.4	20.8	22.2	18.8	26.3	12	22.7	22.4
YELLOW PERCH	35.5	20.6	66.2	28.3	47.9	51.2	47.6	26.4	40.7	16.8	45.6	59.7	31.3	57.9	39.1	20.5	43.3
LONGNOSE SUCKER		2.9		8.0		1.4	1.2	1.9		1.3		0.7	23.4		3.3	2.3	2.3
LARGESCALE SUCKER	6.5	23.5		10.1	1.8	1.4	2.4					0.7	4.7	0.9		2.3	2.1
BROWN BULLHEAD			0.7	2.9	1.8	1.1				2		0.7		0.9	1.1	4.5	1.0
TENCH		14.7	7.3	3.6	15.4	6	15.9	6.6	10.5	6.7	13.6	4.9	3.1	11.4	21.7	22.7	9.5
NORTHERN SQUAWFISH	38.7	17.6	0.7	2.9	0.6	0.7		0.9					12.5		3.3		2.1
PEAMOUTH																	
REDSIDE SHINER																	
SCULPIN																	

Table A.21. Number of each species of fish caught by electrofishing at each Pend Oreille River study site in October, 1989.

STUDY SITE	1	2	3	3A	4	4A	5	5A	6	6A	7	8	9	10	11	TOTAL
SHOCK TIME (MIN)	30	30	30	20	30	25	30	30	30	30	30	30	31	30	30	436
BULL TROUT																
CUTTHROAT TROUT																
BROWN TROUT				1												1
BROOK TROUT																
RAINBOW TROUT												1				1
KOKANEE																
MOUNTAIN WHITEFISH	1	2	4	13	2	2	2		4	1		4	4	4	8	51
LARGEMOUTH BASS	7	6	5	2	5	29	10	82		10	21	12	4	1	2	196
BLACK CRAPPIE				1	1	1		3								6
PUMPKINSEED	2	5	12	3	21	11	28	12	26	47	6	8	10	1	10	202
YELLOW PERCH	13	23	27	4	54	32	149	129	45	48	50	54	61	37	4	730
LONGNOSE SUCKER		1	5	14	3	3	2	3	1	8	4		8	6	3	61
LARGESCALE SUCKER	4	3		3	3	2	1	1	3	6	3	3	3	2	2	39
BROWN BULLHEAD	1			1	8	2		5	3	4						24
TENCH	1	6	3	4	11	17	3	9	7	13	9	8	2	4	3	100
NORTHERN SQUAWFISH	6	23	1	15	3	3					2	3	6	12	3	77
PEAMOUTH		2														2
REDSIDE SHINER																
SCULPIN																
TOTAL	35	71	57	61	111	102	195	244	89	137	95	93	98	67	35	1490

Table A.22. Percent of each species of fish caught by electrofishing at each study site in the Pend Oreille River during October, 1989.

STUDY SITE	1	2	3	3A	4	4A	5	5A	6	6A	7	8	9	10	11	TOTAL
BULL TROUT																
CUTTHROAT TROUT																
BROWN TROUT				1.6												0.1
BROOK TROUT																
RAINBOW TROUT												1.1				0.1
KOKANEE																
MOUNTAIN WHITEFISH	2.9	2.8	7.0	21.3	1.8	2.0	1.0		4.5	0.7		4.3	4.1	6.0	22.9	3.4
LARGEMOUTH BASS	20.0	8.3	8.8	3.3	4.5	28.4	5.1	33.6		7.3	22.1	12.9	4.1	1.5	5.7	13.1
BLACK CRAPPIE				1.6	0.9	1.0		1.2								0.4
PUMPKINSEED	5.7	6.9	21.1	4.9	18.9	10.8	14.4	4.9	29.2	34.3	6.3	8.6	10.2	1.5	28.6	13.5
YELLOW PERCH	37.1	31.9	47.4	6.6	48.6	31.4	76.4	52.9	50.6	35.0	52.6	58.1	62.2	55.2	11.4	49.0
LONGNOSE SUCKER		1.4	8.8	23	2.7	2.9	1.0	1.2	1.1	5.8	4.2		8.2	9.0	8.6	4.1
LARGESCALE SUCKER	11.4	5.6		4.9	2.7	2.0	0.5	0.4	3.4	4.4	3.2	3.2	3.1	3.0	5.7	2.7
BROWN BULLHEAD	2.9			1.6	7.2	2.0		2.0	3.4	2.9						1.6
TENCH	2.9	8.3	5.3	6.6	9.9	16.7	1.5	3.7	7.9	9.5	9.5	8.6	2.0	6	8.6	6.7
NORTHERN SQUAWFISH	17.1	31.9	1.8	24.6	2.7	2.9					2.1	3.2	6.1	17.9	8.6	5.2
PEAMOUTH		2.8														0.1
REDSIDE SHINER																
SCULPIN																

Table A.23. Number of each species of fish caught by electrofishing at each Pend Oreille River study site in November, 1989.

STUDY SITE	1	2	3	3A	4	4A	5	5A	6	6A	7	8	9	10	11	TOTAL
SHOCK TIME (MIN)	30	25	30	17	20	17	20	20	20	20	30	30	30	26	35	370
BULL TROUT																
CUTTHROAT TROUT																
BROWN TROUT				1												1
BROOK TROUT																
RAINBOW TROUT																
KOKANEE		1														1
MOUNTAIN WHITEFISH		2	3	2	1	1					3		1	1	20	34
LARGEMOUTH BASS	4	1	2	4	1	7		6		3				7		35
BLACK CRAPPIE	1			1				5		1						8
PUMPKINSEED	6	4	8	4	3	6	3		5	19	2	1	4	11		76
YELLOW PERCH	8	3	18	4	11	11	3	7	9	9	4	9	22	19	1	138
LONGNOSE SUCKER				3	1	1	1	1	1	8			1	1	1	19
LARGESCALE SUCKER	5	2	4	2			2		1	1	1		2		2	22
BROWN BULLHEAD			1			1	1						1			4
TENCH		3	4	2	1	25	6	9	15	23	4	1	3	29	1	126
NORTHERN SQUAWFISH	3	10	1	3		4	3			1			4	10	2	41
PEAMOUTH		2		1			1									4
REDSIDE SHINER																
SCULPIN																
TOTAL	27	28	41	27	18	56	20	28	31	65	14	11	38	78	27	509

Table A.24. Percent of each species of fish caught by electrofishing at each study site in the Pend Oreille River during November, 1989.

STUDY SITE	1	2	3	3A	4	4A	5	5A	6	6A	7	8	9	10	11	TOTAL
BULL TROUT																
CUTTHROAT TROUT																
BROWN TROUT				3.7												0.2
BROOK TROUT																
RAINBOW TROUT																
KOKANEE		3.6														0.2
MOUNTAIN WHITEFISH		7.1	7.3	7.4	5.6	1.8					21.4		2.6	1.3	74.1	6.7
LARGEMOUTH BASS	14.8	3.6	4.9	14.8	5.6	12.5		21.4		4.6				9.0		6.9
BLACK CRAPPIE	3.7			3.7				17.9		1.5						1.6
PUMPKINSEED	22.2	14.3	19.5	14.8	16.7	10.7	15.0		16.1	29.2	14.3	9.1	10.5	14.1		14.9
YELLOW PERCH	29.6	10.7	43.9	14.8	61.1	19.6	15.0	25.0	29.0	13.8	28.6	81.8	57.9	24.4	3.7	27.1
LONGNOSE SUCKER				11.1	5.6	1.8	5.0	3.6	3.2	12.3			2.6	1.3	3.7	3.7
LARGESCALE SUCKER	18.5	7.1	9.8	7.4			10.0		3.2	1.5	7.1		5.3		7.4	4.3
BROWN BULLHEAD			2.4			1.8	5.0						2.6			0.8
TENCH		10.7	9.8	7.4	5.6	44.6	30.0	32.1	48.4	35.4	28.6	9.1	7.9	37.2	3.7	24.8
NORTHERN SQUAWFISH	11.1	35.7	2.4	11.1		7.1	15.0			1.5			10.5	12.8	7.4	8.1
PEAMOUTH		7.1		3.7			5.0									0.8
REDSIDE SHINER																
SCULPIN																

Table A.25 Number of each species of fish caught by electrofishing at each Pend Oreille River study site in December, 1989.

STUDY SITE	1	2	3	3A	4	4A	5	5A	6	6A	7	8	9	10	11	TOTAL
SHOCK TIME (MN)	30	25	29	10	30	20	30	20	30	20	30	30	30	28	28	390
BULL TROUT																
CUTTHROAT TROUT																
BROWN TROUT	1															1
BROOK TROUT																
RAINBOW TROUT																
KOKANEE																
MOUNTAIN WHITEFISH		1	2			2	4		7		4	10	2	9	21	62
LARGEMOUTH BASS	1					2	1	13		1	2			1		21
BLACK CRAPPIE								3				1				4
PUMPKINSEED	1	1			1	1	3	9	1	1	1	2	1	2		24
YELLOW PERCH	6	5	12	3	4	12	16	7	3	8	9	5	7	2		99
LONGNOSE SUCKER		1				1	2		1	7			1			21
LARGESCALE SUCKER	1	1			1		2	1	1	2	1	1	3		1	15
BROWN BULLHEAD																5
TENCH					2	22	3	7	3	3	5	1	2	3		51
NORTHERN SQUAWFISH		6														
PEAMOUTH		1														
REDSIDE SHINER																
SCULPIN																
TOTAL	10	16	14	3	8	40	36	48	16	22	22	20	17	17	22	311

Table A.26. Percent of each species of fish caught by electrofishing at each study site in‘ the Pend Oreille River during December, 1989.

STUDY SITE	1	2	3	3A	4	4A	5	5A	6	6A	7	8	9	10	11	TOTAL
BULL TROUT																
CUTTHROAT TROUT																
BROWN TROUT	10.0															0.3
BROOK TROUT																
RAINBOW TROUT																
KOKANEE																
MOUNTAIN WHITEFISH		6.3	14.3			5.0	11.1		43.8		18.2	50.0	11.8	52.9	95.5	19.9
LARGEMOUTH BASS	10.0					5.0	2.8	27.1		4.5	9.1			5.9		6.8
BLACK CRAPPIE								6.3				5.0				1.3
PUMPKINSEED	10.0	6.3			12.5	2.5	8.3	18.8	6.3	4.5	4.5	10.0	5.9	11.8		7.7
YELLOW PERCH	60.0	31.3	85.7	100.0	50	30.0	44.4	14.6	18.8	36.4	40.9	25.0	41.2	11.8		31.8
LONGNOSE SUCKER		6.3				2.5	5.6	16.7	6.3	31.8			5.9			6.8
LARGESCALE SUCKER	10.0	6.3			12.5		5.6	2.1	6.3	9.1	4.5	5.0	17.6		4.5	4.8
BROWN BULLHEAD							13.9									1.6
TENCH					25	55.0	8.3	14.6	18.8	13.6	22.7	5.0	11.8	17.6		16.4
NORTHERN SQUAWFISH		37.5											5.9			2.3
PEAMOUTH		6.3														0.3
REDSIDE SHINER																
SCULPIN																

Table A.27. Number of each largemouth bass age class collected during relative abundance electrofishing surveys on the Pend Oreille River, WA (November, 1988-December, 1989).

Age	11/88	12/88	1/89	3/89	4/89	5/89	6/89	7/89	8/89	9/89	10/89	11/89	12/89	Total
0+	38	18	9	3	9	10	45	11	53	100	85	8	10	399
1+	17	11	10	1	5	22	108	68	45	50	48	3	3	391
2+	20	6	2	2	10	24	54	17	47	57	26	8	3	276
3+	17	5	4	1	15	24	92	42	34	16	20	3	1	274
4+	1			1	3	1	5	8	15	17	11	8	4	74
5+					3	1	7	2	1	2		1		17
6+			2		7	1	7	1		1	2			21
7+	1	2	1	4	7	4	3	2		2	2			28
8+	1		1	3	11	6	3	1	1	4	2	2		35
9+	1	1		4	6	4	4	1	3			1		25
10+			1	2	1	2			2	1				9
11+	1	1	1	1	6	1	1		2					14
12+		2			2		2	1	1					8
13+	1		1				2	1	2					7
14+		1		1	3	1		1	1			1		9
15+		1				1								2
Total	98	48	32	23	88	102	333	156	207	250	196	35	21	1589

Table A.28. Percent of each largemouth bass age class collected during relative abundance electrofishing surveys on the Pend Oreille River, WA (November, 1988=December, 1989).

Age	11/88	12/88	1/89	3/89	4/89	5/89	6/89	7/89	8/89	9/89	10/89	11/89	12/89	Total
0+	38.8	37.5	28.1	13.0	10.2	9.8	13.5	7.1	25.6	40.0	43.4	22.9	47.6	25.1
1+	17.3	22.9	31.3	4.3	5.7	21.6	32.4	43.6	21.7	20.0	24.5	8.6	14.3	24.6
2+	20.4	12.5	6.3	8.7	11.4	23.5	16.2	10.9	22.7	22.8	13.3	22.9	14.3	17.4
3+	17.3	10.4	12.5	4.3	17.0	23.5	27.6	26.9	16.4	6.4	10.2	8.6	4.8	17.2
4+	1.0			4.3	3.4	1.0	1.5	5.1	7.2	6.8	5.6	22.9	19.0	4.7
5+					3.4	1.0	2.1	1.3	0.5	0.8		2.9		1.1
6+			6.3		8.0	1.0	2.1	0.6		0.4	1.0			1.3
7+	1.0	4.2	3.1	17.4	8.0	3.9	0.9	1.3		0.8	1.0			1.8
8+	1.0		3.1	13.0	12.5	5.9	0.9	0.6	0.5	1.6	1.0	5.7		2.2
9+	1.0	2.1		17.4	6.8	3.9	1.2	0.6	1.4			2.9		1.6
10+			3.1	8.7	1.1	2.0			1.0	0.4				0.6
11+	1.0	2.1	3.1	4.3	6.8	1.0	0.3		1.0					0.9
12+		4.2			2.3		0.6	0.6	0.5					0.5
13+	1.0		3.1				0.6	0.6	1.0					0.4
14+		2.1		4.3	3.4	1.0		0.6	0.5			2.9		0.6
15+		2.1				1.0								0.1

Table A.29. Number of each yellow perch age class collected during relative abundance electrofishing surveys on the Pend Oreille River, WA (November, 1988-December, 1989).

Age	11/88	12/88	1/89	3/89	4/89	5/89	6/89	7/89	8/89	9/89	10/89	11/89	12/89	Total
0+			2				2	7	45	72	10	2	2	142
1+	4	4	3	1	7	3	10	2	4	41	17	3	2	101
2+	5	2			9	2	20	14	18	4	1	1		76
3+	74	32	9	1	261	29	144	77	58	35	6	3	2	731
4+	183	85	20	5	671	130	527	354	264	149	69	8	9	2474
5+	241	172	15	7	492	195	559	381	297	341	297	69	46	3112
6+	119	59	4		111	65	151	92	106	143	329	52	37	1268
7+						2	1				1		1	5
8+					2	2	2	1	1					8
Total	626	354	53	14	1553	428	1416	928	793	785	730	138	99	7917

Table A.30. Percent of each yellow perch age class collected during relative abundance electrofishing surveys on the Pend Oreille River, WA (November, 19880December, 1989).

Age	11/88	12/88	1/89	3/89	4/89	5/89	6/89	7/89	8/89	9/89	10/89	11/89	12/89	Total
0+			3.8				0.1	0.8	5.7	9.2	1.4	1.4	2.0	1.8
1+	0.6	1.1	5.7	7.1	0.5	0.7	0.7	0.2	0.5	5.2	2.3	2.2	2.0	1.3
2+	0.8	0.6			0.6	0.5	1.4	1.5	2.3	0.5	0.1	0.7		1.0
3+	11.8	9.0	17.0	7.1	16.8	6.8	10.2	8.3	7.3	4.5	0.8	2.2	2.0	9.2
4+	29.2	24.0	37.7	35.7	43.2	30.4	37.2	38.1	33.3	19.0	9.5	5.8	9.1	31.2
5+	38.5	48.6	28.3	50.0	31.7	45.6	39.5	41.1	37.5	43.4	40.7	50.0	46.5	39.3
6+	19.0	16.7	7.5		7.1	15.2	10.7	9.9	13.4	18.2	45.1	37.7	37.4	16.0
7+						0.5	0.1				0.1		1.0	0.1
8+					0.1	0.5	0.1	0.1	0.1					0.1

Table A.31. Number of each mountain whitefish age class collected during relative abundance electrofishing surveys on the Pend Oreille River, WA (November, 1988=December, 1989).

Age	11/88	12/88	1/89	3/89	4/89	5/89	6/89	7/89	8/89	9/89	10/89	11/89	12/89	Total
0+	1	1	2	5	4		1	3					1	18
1+	5	1		4	7	26	8	2			5	1	3	62
2+	12	11	18	34	45	66	23	10	2	2	5	7	11	246
3+	18	20	18	109	69	53	27	57	9	2	13	14	28	437
4+	7	13	13	57	34	18	7	52	18	9	28	12	19	287
5+	1			1						2				4
Total	44	46	51	210	159	163	66	124	29	15	51	34	62	1054

Table A.32. Percent of each mountain whitefish age class collected during relative abundance electrofishing surveys on the Pend Oreille River, WA (November, **1988-December, 1989).**

Age	11/88	12/88	1/89	3/89	4/89	5/89	6/89	7/89	8/89	9/89	10/89	11/89	12/89	Total
0+	2.3	2.2	3.9	2.4	2.5		1.5	2.4					1.6	1.7
1+	11.4	2.2		1.9	4.4	16.0	12.1	1.6			9.8	2.9	4.8	5.9
2+	27.3	23.9	35.3	16.2	28.3	40.5	34.8	8.1	6.9	13.3	9.8	20.6	17.7	23.3
3+	40.9	43.5	35.3	51.9	43.4	32.5	40.9	46.0	31.0	13.3	25.5	41.2	45.2	41.5
4+	15.9	28.3	25.5	27.1	21.4	11.0	10.6	41.9	62.1	60.0	54.9	35.3	30.6	27.2
5+	2.3			0.5						13.3				0.4

Table **A.33.** Number of each black crappie age class collected during relative abundance **electrofishing** surveys on the **Pend Oreille** River, WA (November, **1988-December, 1989).**

Age	11/88	12/88	1/89	3/89	4/89	5/89	6/89	7/89	8/89	9/89	10/89	11/89	12/89	Total
0+	1		2	1			2		4	11	3	5	3	32
1+	1							2	1	3				7
2+	1	2	1				2	1		3		2		12
3+	7	4	4		14	5	16	1						51
4+	3	2	3		14		17	7	4	3				53
5+	2	3			23	3	2	5	6	12	2	1	1	60
6+		1	1	1	4	1		1						9
7+					2	2					1			5
8+		2			1					1				4
Total	15	14	11	2	58	11	39	17	15	33	6	8	4	233

Table **A.34.** Percent of each black crappie age class collected during relative abundance **electrofishing** surveys on the **Pend Oreille** River, WA (November, **1988-December, 1989).**

Age	11/88	12/88	1/89	3/89	4/89	5/89	6/89	7/89	8/89	9/89	10/89	11/89	12/89	Total
0+	6.7		18.2	50.0			5.1		26.7	33.3	50.0	62.5	75.0	13.7
1+	6.7							11.8	6.7	9.1				3.0
2+	6.7	14.3	9.1				5.1	5.9		9.1		25.0		5.2
3+	46.7	28.6	36.4		24.1	45.5	41.0	5.9						21.9
4+	20.0	14.3	27.3		24.1		43.6	41.2	26.7	9.1				22.7
5+	13.3	21.4			39.7	27.3	5.1	29.4	40.0	36.4	33.3	12.5	25.0	25.8
6+		7.1	9.1	50.0	6.9	9.1		5.9						3.9
7+					3.4	18.2					16.7			2.1
8+		14.3			1.7					3.0				1.7

Table **A.35.** Number of each brown trout age class collected during relative abundance **electrofishing** surveys on the **Pend Oreille** River, WA (November, **1988-December, 1989).**

Age	11/88	12/88	1/89	3/89	4/89	5/89	6/89	7/89	8/89	9/89	10/89	11/89	12/89	Total
0+	1				1	2								4
1+	1			1	0	16	3	2						23
2+		4	1	1	3	3	2	2		2			1	19
3+		2	1	4	7	7	1	1	2					25
4+		1						4	3					8
5+	1						1		1	2				5
6+	2								3	2		1		8
7+	2							1	3	2	1			9
8+								5	6	5				16
Total	7	7	2	6	11	28	7	15	18	13	1	1	1	117

Table **A.36.** Percent of each brown trout age class collected during relative abundance **electrofishing** surveys on the **Pend Oreille** River, WA (November, **1988-December, 1989).**

Age	11/88	12/88	1/89	3/89	4/89	5/89	6/89	7/89	8/89	9/89	10/89	11/89	12/89	Total
0+	14.3				9.1	7.1								3.4
1+	14.3			16.7		57.1	42.9	13.3						19.7
2+		57.1	50.0	16.7	27.3	10.7	28.6	13.3		15.4			100.0	16.2
3+		28.6	50.0	66.7	63.6	25.0	14.3	6.7	11.1					21.4
4+		14.3						26.7	16.7					6.8
5+	14.3						14.3		5.6	15.4				4.3
6+	28.6								16.7	15.4		100.0		6.8
7+	28.6							6.7	16.7	15.4	100.0			7.7
8+								33.3	33.3	38.5				13.7

Table **A.37.** Number of each cutthroat trout age class **collected** during relative abundance **electrofishing** surveys on the **Pend Oreile** River, WA (November, **1988-December, 1989).**

Age	8811	8812	8901	8903	8904	8905	8906	8907	8908	8909	8910	8911	8912	Total
0+														0
1+		1												1
2+		2			1	2								5
3+					1	2								3
4+		1		2	1									4
5+			1			1								2
Total		4	1	2	3	5								15

Table **A.38.** Percent of each cutthroat trout age class collected during relative abundance **electrofishing** surveys on the **Pend Oreille** River, WA (November, **1988-December, 1989).**

Age	8811	8812	8901	8903	8904	8905	8906	8907	8908	8909	8910	8911	8912	Total
0+														
1+		25.0												6.7
2+		50.0			33.3	40.0								33.3
3+					33.3	40.0								20.0
4+		25.0		100.0	33.3									26.7
5+			100.0			20.0								13.3

Table **A.39.** Number of each rainbow trout age class collected during relative abundance **electrofishing** surveys on the **Pend Oreille** River, WA (November, **1988-December, 1989).**

Age	11/88	12/88	1/89	3/89	4/89	5/89	6/89	7/89	8/89	9/89	10/89	11/89	12/89	Total
0+							1							1
1+	1					2	1							4
2+	1			1		1								3
3+								2	1		1			4
4+						1								1
5+														
6+														
Total	2			1		4	2	2	1		1			13

Table **A.40.** Percent of each rainbow trout age class collected during relative abundance **electrofishing** surveys on the **Pend Oreille** River, WA (November, **1988-December, 1989).**

Age	11/88	12/88	1/89	3/89	4/89	5/89	6/89	7/89	8/89	9/89	10/89	11/89	12/89	Total
0+							50.0							7.7
1+	50.0					50.0	50.0							30.8
2+	50.0			100.0		25.0								23.1
3+								100.0	100.0		100.0			30.8
4+						25.0								7.7
5+														
6+														

Table **A.41.** Number of each **kokanee** age class collected during relative abundance **electrofishing** surveys on the **Pend Oreille** River, WA (November, **1988-December, 1989).**

Age	11/88	12/88	1/89	3/89	4/89	5/89	6/89	7/89	8/89	9/89	10/89	11/89	12/89	Total
0+				1								1		2
1+					1	1								2
2+						2	1		1					4
3+						2			1	1				4
Total				1	1	5	1		2	1				12

Table **A.42.** Percent of each **kokanee** age class collected during relative abundance **electrofishing** surveys on the **Pend Oreille** River, WA (November, **1988-December, 1989).**

Age	11/88	12/88	1/89	3/89	4/89	5/89	6/89	7/89	8/89	9/89	10/89	11/89	12/89	Total
0+				100										16.7
1+					100	20.0								16.7
2+						40.0	100		50.0					33.3
3+						40.0			50.0	100				33.3

Table **A.43.** Number of each pumpkinseed age class collected during relative abundance **electrofishing** surveys on the **Pend Oreille** River, WA (November, **1988-December, 1989).**

Age	11/88	12/88	1/89	3/89	4/89	5/89	6/89	7/89	8/89	9/89	10/89	11/89	12/89	Total
0+	22	6	7			2	2	23	4	26	6	6	2	106
1+	1	1	8			1	4	10	20	79	46	17	1	188
2+	16	17	22		2	9	35	18	10	47	22	5	7	210
3+	56	19	18	1	7	23	164	54	37	23	9	6	1	418
4+	47	29	22	1	16	54	177	74	60	65	32	12	6	595
5+	65	12	17	2	45	72	248	65	67	73	36	9	2	713
6+	51	9	13		49	49	164	30	53	70	46	18	3	555
7+	10	1	1		8	8	23	9	6	12	3	2	1	84
8+	1	1			1		7	2	1	11	2	1	1	28
Total	269	95	108	4	128	218	824	285	258	406	202	76	24	2897

Table **A.44.** Percent of each pumpkinseed age class collected during relative abundance **electrofishing** surveys on the **Pend Oreille** River, WA (November, **1988-December, 1989).**

Age	11/88	12/88	1/89	3/89	4/89	5/89	6/89	7/89	8/89	9/89	10/89	11/89	12/89	Total
0+	8.2	6.3	6.5			0.9	0.2	8.1	1.6	6.4	3.0	7.9	8.3	3.7
1+	0.4	1.1	7.4			0.5	0.5	3.5	7.8	19.5	22.8	22.4	4.2	6.5
2+	5.9	17.9	20.4		1.6	4.1	4.2	6.3	3.9	11.6	10.9	6.6	29.2	7.2
3+	20.8	20.0	16.7	25.0	5.5	10.6	19.9	18.9	14.3	5.7	4.5	7.9	4.2	14.4
4+	17.5	30.5	20.4	25.0	12.5	24.8	21.5	26.0	23.3	16.0	15.8	15.8	25.0	20.5
5+	24.2	12.6	15.7	50.0	35.2	33.0	30.1	22.8	26.0	18.0	17.8	11.8	8.3	24.6
6+	19.0	9.5	12.0		38.3	22.5	19.9	10.5	20.5	17.2	22.8	23.7	12.5	19.2
7+	3.7	1.1	0.9		6.3	3.7	2.8	3.2	2.3	3.0	1.5	2.6	4.2	2.9
8+	0.4	1.1			0.8		0.8	0.7	0.4	2.7	1.0	1.3	4.2	1.0

Table **A.45.** Number of each **tench** age class collected during relative abundance **electrofishing** surveys on the **Pend Oreille** River, WA (November, **1988-December, 1989).**

Age	11/88	12/88	1/89	3/89	4/89	5/89	6/89	7/89	8/89	9/89	10/89	11/89	12/89	Total
0+	8	1	2		1			8	4	9	18	6	2	59
1+	9	1	5		1	7	16	1	1	16	9	1	2	69
2+	16	8		2	1	12	14	6	3	9	3	5	1	80
3+	37	5	4	2	4	14	13	12	13	15	5	10	2	136
4+	15	9	5	2	7	11	23	14	22	27	17	19	3	174
5+	25	2	7	2	9	7	40	31	32	33	8	22	3	221
6+	28	5	10	1	29	8	41	50	21	33	20	24	14	284
7+	38	30	16	7	39	10	47	33	28	25	13	33	17	336
8+	20	7	3	3	10	7	16	11	4	5	7	6	7	106
Total	196	68	52	19	101	76	210	166	128	172	100	126	51	1465

Table **A.46.** Percent of each **tench** age class collected during relative abundance **electrofishing** surveys on the **Pend Oreille** River, WA (November, **1988-December, 1989).**

Age	11/88	12/88	1/89	3/89	4/89	5/89	6/89	7/89	8/89	9/89	10/89	11/89	12/89	Total
0+	4.1	1.5	3.8		1.0			4.8	3.1	5.2	18.0	4.8	3.9	4.0
1+	4.6	1.5	9.6		1.0	9.2	7.6	0.6	0.8	9.3	9.0	0.8	3.9	4.7
2+	8.2	11.8		10.5	1.0	15.8	6.7	3.6	2.3	5.2	3.0	4.0	2.0	5.5
3+	18.9	7.4	7.7	10.5	4.0	18.4	6.2	7.2	10.2	8.7	5.0	7.9	3.9	9.3
4+	7.7	13.2	9.6	10.5	6.9	14.5	11.0	8.4	17.2	15.7	17.0	15.1	5.9	11.9
5+	12.8	2.9	13.5	10.5	8.9	9.2	19.0	18.7	25.0	19.2	8.0	17.5	5.9	15.1
6+	14.3	7.4	19.2	5.3	28.7	10.5	19.5	30.1	16.4	19.2	20.0	19.0	27.5	19.4
7+	19.4	44.1	30.8	36.8	38.6	13.2	22.4	19.9	21.9	14.5	13.0	26.2	33.3	22.9
8+	10.2	10.3	5.8	15.8	9.9	9.2	7.6	6.6	3.1	2.9	7.0	4.8	13.7	7.2

Table **A.47.** Number of each northern squawfish age class collected during relative abundance **electrofishing** surveys on the **Pend Oreille** River, WA (November, **1988-December, 1989).**

Age	11/88	12/88	1/89	3/89	4/89	5/89	6/89	7/89	8/89	9/89	10/89	11/89	12/89	Total
0+		1	1				3		1		1	3		10
1+	1				1	1	5	1	2	1				12
2+	43	3	7	1	7	6	43	9	14	3	5		2	143
3+	40	11	12	1	9	17	36	18	23	19	41	14	4	245
4+	15	16	1	2	5	5	7	20	14	7	23	13		128
5+	7	11	1	1	3	2	3	9	3	7	5	8	1	61
6+		1			2		1	1			2	3		10
7+		2			1									3
8+		1	1											2
9+			1		1			2						4
10+					1					1				2
Total	106	46	24	5	30	31	98	60	57	38	77	41	7	620

Table A.48. Percent of each northern squawfish age class collected during relative abundance electrofishing surveys on the Pend Oreille River, WA (November, 1988-December, 1989).

Age	11/88	12/88	1/89	3/89	4/89	5/89	6/89	7/89	8/89	9/89	10/89	11/89	12/89	Total
0+		2.2	4.2				3.1		1.8		1.3	7.3		1.6
1+	0.9				3.3	3.2	5.1	1.7	3.5	2.6				1.9
2+	40.6	6.5	29.2	20.0	23.3	19.4	43.9	15.0	24.6	7.9	6.5		28.6	23.1
3+	37.7	23.9	50.0	20.0	30.0	54.8	36.7	30.0	40.4	50.0	53.2	34.1	57.1	39.5
4+	14.2	34.8	4.2	40.0	16.7	16.1	7.1	33.3	24.6	18.4	29.9	31.7		20.6
5+	6.6	23.9	4.2	20.0	10.0	6.5	3.1	15.0	5.3	18.4	6.5	19.5	14.3	9.8
6+		2.2			6.7		1.0	1.7			2.6	7.3		1.6
7+		4.3			3.3									0.5
8+		2.2	4.2											0.3
9+			4.2		3.3			3.3						0.6
10+					3.3					2.6				0.3

Table A.49. Number of each largescale sucker age class collected during relative abundance electrofishing surveys on the Pend Oreille River, WA (November, 1988-December, 1989).

Age	11/88	12/88	1/89	3/89	4/89	5/89	6/89	7/89	8/89	9/89	10/89	11/89	12/89	Total
0+							4	2			3			9
1+						1	2							3
2+							2							2
3+	2				7		4	1	1	2		1		18
4+	3			1	7	3	6	2	1	1	1	1	1	27
5+	6	6	1	1	24	5	6	13	2	3	2	4		73
6+	10	5	5	11	41	11	31	27	9	9	7	4	3	173
7+	11	6	11	14	22	12	28	17	6	5	6	2	1	141
8+	18	10	19	20	19	23	16	10	15	8	11	7	5	181
9+	9	2	10	10	17	9	13	5	8	8	6	3		100
10+	5	3	3	5	4	4	10	3	6	3	2		4	52
11+			2	2	1	1	1	1			1		1	10
Total	64	32	51	64	142	69	123	81	48	39	39	22	15	789

Table A.50. Percent of each largescale sucker age class collected during relative abundance electrofishing surveys on the Pend Oreille River, WA (November, 1988-December, 1989).

Age	11/88	12/88	1/89	3/89	4/89	5/89	6/89	7/89	8/89	9/89	10/89	11/89	12/89	Total
0+							3.3	2.5			7.7			1.1
1+						1.4	1.6							0.4
2+							1.6							0.3
3+	3.1				4.9		3.3	1.2	2.1	5.1		4.5		2.3
4+	4.7			1.6	4.9	4.3	4.9	2.5	2.1	2.6	2.6	4.5	6.7	3.4
5+	9.4	18.8	2.0	1.6	16.9	7.2	4.9	16.0	4.2	7.7	5.1	18.2		9.3
6+	15.6	15.6	9.8	17.2	28.9	15.9	25.2	33.3	18.8	23.1	17.9	18.2	20.0	21.9
7+	17.2	18.8	21.6	21.9	15.5	17.4	22.8	21.0	12.5	12.8	15.4	9.1	6.7	17.9
8+	28.1	31.3	37.3	31.3	13.4	33.3	13.0	12.3	31.3	20.5	28.2	31.8	33.3	22.9
9+	14.1	6.3	19.6	15.6	12.0	13.0	10.6	6.2	16.7	20.5	15.4	13.6		12.7
10+	7.8	9.4	5.9	7.8	2.8	5.8	8.1	3.7	12.5	7.7	5.1		26.7	6.6
11+			3.9	3.1	0.7	1.4	0.8	1.2			2.6		6.7	1.3

Table **A.51**. Number of each **longnose** sucker age class collected during relative abundance **electrofishing** surveys on the **Pend Oreille** River, WA (November, **1988-December, 1989).**

Age	11/88	12/88	1/89	3/89	4/89	5/89	6/89	7/89	8/89	9/89	10/89	11/89	12/89	Total
0+	2		1				1			2	3	1		10
1+	1		1		2									4
2+	2	1			1			2						6
3+	11	4	4		15		2	1	1	1				39
4+	16	10	9	5	13	9	9	11	9	8	11	4	2	116
5+	8	3	2	4	7	3	3	1	2	2	9	3	2	49
6+	1	5	3	1	3	3	4	4	6	1	4	3	1	39
7+	19	8	13	17	15	28	22	22	38	27	34	8	16	267
Total	60	31	33	27	56	43	41	41	56	41	61	19	21	530

Table **A.52.** Percent of each **longnose** sucker age class collected during relative abundance **electrofishing** surveys on the **Pend Oreille** River, WA (November, **1988-December, 1989).**

Age	11/88	12/88	1/89	3/89	4/89	5/89	6/89	7/89	8/89	9/89	10/89	11/89	12/89	Total
0+	3.3		3.0				2.4			4.9	4.9	5.3		1.9
1+	1.7		3.0		3.6									0.8
2+	3.3	3.2			1.8			4.9						1.1
3+	18.3	12.9	12.1		26.8		4.9	2.4	1.8	2.4				7.4
4+	26.7	32.3	27.3	18.5	23.2	20.9	22.0	26.8	16.1	19.5	18.0	21.1	9.5	21.9
5+	13.3	9.7	6.1	14.8	12.5	7.0	7.3	2.4	3.6	4.9	14.8	15.8	9.5	9.2
6+	1.7	16.1	9.1	3.7	5.4	7.0	9.8	9.8	10.7	2.4	6.6	15.8	4.8	7.4
7+	31.7	25.8	39.4	63.0	26.8	65.1	53.7	53.7	67.9	65.9	55.7	42.1	76.2	50.4

Table **A.53.** Number of each **peamouth** age class collected during relative abundance **electrofishing** surveys on the **Pend Oreille** River, WA (November, **1988-December, 1989).**

Age	11/88	12/88	1/89	3/89	4/89	5/89	6/89	7/89	8/89	9/89	10/89	11/89	12/89	Total
0+	2				2		2					1		7
1+					1	1		1						3
2+		1			7	2	1	1						12
3+				2	1			1				1		5
4+	2			1	2	2	1	2	1			2	1	14
5+		1			3	1	1	12	1		2			21
Total	4	2	0	3	16	6	5	17	2	0	2	4	1	62

Table **A.54.** Percent of each **peamouth** age class collected during relative abundance **electrofishing** surveys on the **Pend Oreille** River, WA (November, **1988-December, 1989).**

Age	11/88	12/88	1/89	3/89	4/89	5/89	6/89	7/89	8/89	9/89	10/89	11/89	12/89	Total
0+	50.0				12.5		40.0					25.0		11.3
1+					6.3	16.7		5.9						4.8
2+		50.0			43.8	33.3	20.0	5.9						19.4
3+				66.7	6.3			5.9				25.0		8.1
4+	50.0			33.3	12.5	33.3	20.0	11.8	50.0			50.0	100.0	22.6
5+		50.0			18.8	16.7	20.0	70.6	50.0		100.0			33.9

Table **A.55.** Number of each brown bullhead size class collected during relative abundance **electrofishing** surveys on the **Pend Oreille** River, WA (November, **1988-December, 1989).**

Range (mm)	11/88	12/88	1/89	3/89	4/89	5/89	6/89	7/89	8/89	9/89	10/89	11/89	12/89	Total
0-100	1	2												3
101-150	1	1		1	1				1		1			6
151-200	15	13	6	15		2	18	6	2	1	5	2	3	88
201-250	5	3	1	1	15	2	12	8	7	15	15	1	2	87
251-300	2	3	6	2	10	1	2	1	1	3	3	1		35
Total	24	22	13	19	26	5	32	15	11	19	24	4	5	219

Table **A.56.** Percent of each brown bullhead size class collected during relative abundance **electrofishing** surveys on the **Pend Oreille** River, WA (November, **1988-December, 1989).**

Range (mm)	11/88	12/88	1/89	3/89	4/89	5/89	6/89	7/89	8/89	9/89	10/89	11/89	12/89	Total
0-100	4.2	9.1												1.4
101-150	4.2	4.5		5.3	3.8				9.1		4.2			2.7
151-200	62.5	59.1	46.2	78.9		40.0	56.3	40.0	18.2	5.3	20.8	50.0	60.0	40.2
201-250	20.8	13.6	7.7	5.3	57.7	40.0	37.5	53.3	63.6	78.9	62.5	25.0	40.0	39.7
251-300	8.3	13.6	46.2	10.5	38.5	20.0	6.3	6.7	9.1	15.8	12.5	25.0		16.0

Table **A.57.** Number and percent of each species of fish caught by beach seining in July, **1989.**

STUDY SITE	4A	5A	8C	9A	TOTAL
DISTANCE SEINED (M)	61	76	91.5	91.5	320
LARGEMOUTH BASS	11(34.4)	30(62.5)	13(11.3)	106(99.1)	160 (53.0)
PUMPKINSEED	17(53.1)	18(37.5)	101(87.8)	1 (0.9)	137 (45.4)
YELLOW PERCH	4 (12.5)				4 (1.3)
BROWN BULLHEAD			1 (0.9)		1 (0.3)
TOTAL	32	48	115	107	302

Table **A.58.** Number and percent of each species of fish caught by beach seining in August, **1989.**

STUDY SITE	4A		5A		TOTAL	
DISTANCE SEINED (M)	91.5		91.5		183.0	
LARGEMOUTH BASS			19	(15.4)	19	(9.4)
YELLOW PERCH	3	(3.8)	10	(8.1)	13	(6.4)
BLACK CRAPPIE			2	(1.6)	2	(1.0)
PUMPKINSEED	22	(27.5)	84	(68.3)	106	(52.2)
TENCH	55	(68.8)	8	(6.5)	63	(31.0)
TOTAL	80		123		203	

Table A.59. Number and percent of each species of fish caught by beach seining in September, 1989.

STUDY SITE	4A		5A		TOTAL	
DISTANCE SEINED (M)	91.5		61		152.5	
LARGEMOUTH BASS	5	(1.9)	3	(7.3)	8	(2.7)
YELLOW PERCH	43	(17.0)	1	(2.4)	44	(15.0)
BLACK CRAPPIE	6	(2.3)	5	(12.0)	11	(3.7)
PUMPKINSEED	(7205)	(79.0)	32		237	(79.0)
TOTAL	259		41		300	

APPENDIX B

MONTHLY MARK AND RECAPTURE DATA FOR EACH FISH SPECIES IN THE RIVER AND POPULATION ESTIMATION DATA FOR EACH FISH SPECIES IN THE TRIBUTARIES

Table **B.1.** Number of yellow perch one year and older caught, marked, and recaptured in the **Pend Oreille** River, during June through December, **1989.**

MONTH	# CAUGHT(Ct)	RECAP (Rt)	# MARKED	TOTAL MARKED(Mt)	CtMt	SCHNABEL	LOWER LIMIT	UPPER LIMIT
8906	1414	0	1226	0	0			
8907	929	3	787	1226	1138954			
8908	748	5	742	2013	1505724			
8909	727	10	579	2755	2002885			
8910	720	5	569	3334	2400480			
8911	136	0	136	3903	530808			
8912	97	4	- - -	4039	391783			
TOTAL	4771	27	4039	17270	7970634	295209	203333	447788
					RIVER EST.	6010448	4139850	9116972

Table **B.2.** Number of pumpkinseeds one year and older caught, marked and recaptured in the **Pend Oreille** River, during June through December, **1989.**

MONTH	# CAUGHT (Ct)	RECAP (Rt)	# MARKED	TOTAL MARKED (Mt)	CtMt	SCHNABEL	LOWER LIMIT	UPPER LIMIT
8906	842	0	800	0	0			
8907	325	1	227	800	260000			
8908	260	2	238	1027	267020			
8909	408	5	366	1265	516120			
8910	196	0	152	1631	319676			
8911	70	0	70	1783	124810			
8912	22	0	- - -	1853	40766			
Total	2123	8	1853	8359	1528392	191049	96734	449527
					RIVER EST.	3889758	1969498	9152371

Table **B.3.** Number of **tench** one year and older caught, marked, and recaptured in the **Pend Oreille** River, during June through December, **1989.**

MONTH	# CAUGHT (Ct)	RECAP (Rt)	# MARKED	TOTAL MARKED (Mt)	CtMt	Schnabel	LOWER LIMIT	UPPER LIMIT
8906	212	0	192	0	0			
8907	159	0	147	192	30528			
8908	125	0	124	339	42375			
8909	163	1	150	463	75469			
8910	82	1	71	613	50266			
8911	120	2	118	684	82080			
8912	49	2	- - -	802	39298			
Total	910	6	802	3093	320016	53336	24429	145462
					RIVER EST.	1085921	497368	2961603

Table **B.4.** Number of largemouth bass one year and older caught, marked, and recaptured in the **Pend Oreille** River, during June through December, **1989.**

MONTH	# CAUGHT(Ct)	RECAP (Rt)	# MARKED	TOTAL MARKED (Mt)	CtMt	SCHNABEL	LOWER LIMIT	UPPER LIMIT
8906	289	0	204	0	0			
8907	147	2	82	204	29988			
8908	175	1	180	286	50050			
8909	150	2	72	466	69900			
8910	111	3	47	538	59718			
8911	27	0	27	585	15795			
8912	11	0	- - -	612	6732			
Total	910	8	612	2691	232183	29023	14695	68289
					RIVER EST.	590906	299193	1390366

Table **B.5.** Number of northern **squawfish** one year and older caught, marked, and recaptured in the **Pend Oreille** River, during June through December, **1989.**

MONTH	# CAUGHT (Ct	RECAP (Rt)	# MARKED	TOTAL MARKED (Mt)	CtMt	SCHNABEL	LOWER LIMIT	UPPER LIMIT
8906	95	0	82	0	0			
8907	65	0	50	82	5330			
8908	57	1	55	132	7524			
8909	38	2	26	187	7106			
8910	76	0	65	213	16188			
8911	38	1	37	278	10564			
8912	7	0	- - -	315	2205			
Total	376	4	315	1207	48917	12229	4796	48917
					RIVER EST.	248988	97642	995950

Table **B.6.** Number of **largescale** suckers one year and older caught, marked, and recaptured in the **Pend Oreille** River, during June through December, **1989.**

MONTH	# CAUGHT (Ct	RECAP (Rt)	# MARKED	TOTAL MARKED (Mt)	CtMt	SCHNABEL	LOWER LIMIT	UPPER LIMIT
8906	119	0	105	0	0			
8907	79	0	69	105	8295			
8908	49	1	48	174	8526			
8909	39	3	33	222	8658			
8910	37	0	32	255	9435			
8911	22	0	21	287	6314			
8912	15	1	- - -	308	4620			
Total	360	5	308	1351	45848	9170	3919	28655
					RIVER EST.	186693	79783	583416

Table B.7. Number of longnose suckers one year and older caught, marked, and recaptured in the Pend Oreille River, during June through December, 1989.

MONTH	# CAUGHT (Ct)	RECAP (Rt)	# MARKED	TOTAL MARKED (Mt)	CtMt	SCHNABEL	LOWER LIMIT	UPPER LIMIT
8906	41	0	34	0	0			
8907	41	0	33	34	1394			
8908	56	1	54	67	3752			
8909	39	2	33	121	4719			
8910	58	0	48	154	8932			
8911	18	0	17	202	3636			
8912	21	0	- - -	219	4599			
Total	274	3	219	797	27032	9011	3072	45053
					RIVER EST.	183457	62542	917286

Table B.8. Number of mountain whitefish one year and older caught, marked, and recaptured in the Pend Oreille River, during June through December, 1989.

MONTH	# CAUGHT (Ct)	RECAP (Rt)	# MARKED	TOTAL MARKED (Mt)	CtMt	SCHNABEL	LOWER LIMIT	UPPER LIMIT
8906	65	0	31	0	0			
8907	126	1	108	31	3906			
8908	39	0	36	139	5421			
8909	15	1	2	175	2625			
8910	51	1	4	177	9027			
8911	34	0	34	181	6154			
8912	61	2	- - -	215	13115			
Total	391	5	215	918	40248	8050	3440	25155
					RIVER EST.	163890	70038	512156

Table B.9. Number of brown bullheads one year and older caught, marked, and recaptured in the Pend Oreille River, during June through December, 1989.

MONTH	# CAUGHT (Ct)	RECAP (Rt)	# MARKED	TOTAL MARKED (Mt)	CtMt	SCHNABEL	LOWER LIMIT	UPPER LIMIT
8906	32	0	4	0	0			
8907	16	0	6	4	64			
8908	11	0	11	10	110			
8909	19	1	10	21	399			
8910	24	0	18	31	744			
8911	4	0	4	49	196			
8912	5	0	- - -	53	265			
Total	111	1	53	168	1778	1778	318	17780
					RIVER EST.	36200	6464	362001

52

Table B.10. Number of brown trout one year and older caught, marked, and recaptured in the Pend Oreille River, during June through December, 1989.

MONTH	# CAUGHT (Ct)	RECAP (Rt)	# MARKED	TOTAL MARKED (Mt)	CtMt	SCHNABEL	LOWER LIMIT	UPPER LIMIT
8906	7	0	1	0	0			
8907	35	0	30	1	35			
8908	27	2	24	31	837			
8909	13	2	10	55	715			
8910	1	0	1	65	65			
8911	1	1	0	66	66			
8912	1	0	- - -	66	66			
Total	85	5	66	284	1784	357	152	1115
					RIVER EST.	7264	3104	22701

Table B.11. Number of brown trout one year and older caught, marked, and recaptured at study site 3A during July through December, 1989

MONTH	# CAUGHT (Ct	RECAP (Rt)	# MARKED	TOTAL MARKED(Mt)	CtMt	SCHNABEL	LOWER LIMIT	UPPER LIMIT
8907	18	0	16	0	0			
8908	13	1	12	16	208			
8909	11	1	10	28	308			
8910	1	0	1	38	38			
8911	1	1		39	39			
Total	44	3	39	121	593	198	58	593

Table B.12. Number of brown trout one year and older caught, marked, and recaptured at study site 8A during July through September, 1989.

MONTH	# CAUGHT (Ct	RECAP (Rt)	# MARKED	TOTAL MARKED (Mt)	CtMt	SCHNABEL	LOWER LIMIT	UPPER LIMIT
8907	7	0	7	0	0			
8908	5	1	4	7	35			
8909	1	1		11	11			
Total	13	2	11	18	46	23	5	46

Table **B.13.** Number fish caught in each pass of a removal-depletion population estimate, estimated population (N ± 95% confidence intervals) and fish density for each species of trout, at each reach, in **Skookum** Creek on September **27, 1989.**

REACH#:1 DATE: **9-27-89** LENGTH: **300 ft** MEAN WIDTH: **20.8 ft** AREA **(M^2): 579.7**

SPECIES	#1ST PASS	#2ND PASS	#3RD PASS	#4TH PASS	N	±C.I.	#/100 M2
Brown trout	6	6	3		16.3	2.9	2.8±0.5

REACH#: 2 DATE: **9-27-89** LENGTH: **300 ft** MEAN WIDTH: **8.7 ft** AREA **(M^2): 242.5**

SPECIES	#1ST PASS	#2ND PASS	#3RD PASS	#4TH PASS	N	±C.I.	#/100 M2
Brown trout	138	41			196.3	15.8	80.9±6.5
Brook trout	21	4			25.9	2.8	10.7±1.2

REACH#: 3 DATE: **9-27-89** LENGTH: **300 ft** MEAN WIDTH: **14.2 ft** AREA **(M^2): 395.8**

SPECIES	#1ST PASS	#2ND PASS	#3RD PASS	#4TH PASS	N	±C.I.	#/100 M2
Brook trout	28	10			43.6	10.4	11.0±2.6
Brown trout	6	3			12.0	11.8	3.0±3.0
Cutthroat trout	5	2	-		8.3	5.8	2.1±1.5

REACH#:4 DATE: **9-27-89** LENGTH: **300 ft** MEAN WIDTH: **19.5 ft** AREA **(M^2): 543.5**

SPECIES	#1ST PASS	#2ND PASS	#3RD PASS	#4TH PASS	N	±C.I.	#/100 M2
Brown trout	178	63	-		275.5	25.8	50.7±4.7
Cutthroat trout	1	0			1	0	0.2±0.0

Table B.14. Number of fish caught in each pass of a removal-depletion population estimate, estimated population (N ± 95 % confidence intervals) and fish density for each species of trout, at each reach, in Cee Cee Ah Creek on September 26 and 28, 1989.

REACH#: 1 DATE: 9-26-89 LENGTH: 300 ft MEAN WIDTH: 12.2 ft AREA (M^2): 340.0

SPECIES	#1ST PASS	#2ND PASS	#3RD PASS	#4TH PASS	N	±C.I.	#/100 M2
Brown trout	29	18	14	9	87.5	21.2	25.7±6.2

REACH#: 2 DATE: 9-26-89 LENGTH: 360 ft MEAN WIDTH: 16.2 ft AREA (M^2): 541.8

SPECIES	#1ST PASS	#2ND PASS	#3RD PASS	#4TH PASS	N	±C.I.	#/100 M2
Brown trout	104	48			193.1	38.5	35.6±7.1
Brook trout	5	6					

REACH#: 3 DATE: 9-28-89 LENGTH: 300 ft MEAN WIDTH: 10.9 ft AREA (M^2): 303.8

SPECIES	#1ST PASS	#2ND PASS	#3RD PASS	#4TH PASS	N	±C.I.	#/100 M2
Brown trout	10	2			12.5	2.3	4.1±0.8
Brook trout	16	9			36.6	28.8	12.0±9.5
Cutthroat trout	19	10		-	40.1	24.8	13.2±8.2

REACH#: 4 DATE: 9-28-89 LENGTH: 300 ft MEAN WIDTH: 8.4 ft AREA (M^2): 234.1

SPECIES	#1ST PASS	#2ND PASS	#3RD PASS	#4TH PASS	N	±C.I.	#/100 M2
Brook trout	52	18			79.5	13.3	34.0±5.7

Table B.15. Number of fish caught in each pass of a removal-depletion population estimate, estimated population (N ± 95% confidence intervals), and fish density for each species of trout, at each reach, in Tacoma Creek on September 7 and 28, 1989.

REACH#: 1 DATE: 9-7-89 LENGTH: 200 ft MEAN WIDTH: 23.3 ft AREA (M^2): 432.9

SPECIES	#1ST PASS	#2ND PASS	#3RD PASS	#4TH PASS	N	±C.I.	#/100 M2
Brook trout	68	19			94.4	9.8	21.8±2.3
Cutthroat trout	10	3			14.3	4.3	3.3±1.0

REACH#: 2 DATE: 9-7-89 LENGTH: 200 ft MEAN WIDTH: 18.8 ft AREA (M^2): 349.3

SPECIES	#1ST PASS	#2ND PASS	#3RD PASS	#4TH PASS	N	±C.I.	#/100 M2
Brook trout	51	27	11		91.8	3.9	26.3±1.1
Cutthroat trout	11	3	1		15.0	0.0	4.3±0.0

REACH#: 3 DATE: 9-28-89 LENGTH:300 ft MEAN WIDTH: 21.8 ft AREA (M^2): 607.6

SPECIES	#1ST PASS	#2ND PASS	#3RD PASS	#4TH PASS	N	±C.I.	#/100 M2
Brook trout	97	22			125.5	8.1	20.7±1.3
Cutthroat trout	18	3			21.6	2.2	3.6±0.4

REACH#: 4 DATE: 9-28-89 LENGTH: 300 ft MEAN WIDTH: 19.1 ft AREA (M^2): 532.3

SPECIES	#1ST PASS	#2ND PASS	#3RD PASS	#4TH PASS	N	±C.I.	#/100 M2
Brook trout	42	12			58.8	8.1	11.0±1.5
Cutthroat trout	13	6			24.1	13.6	4.5±2.6

Table **B.16.** Number of fish caught in each pass of a removal-depletion population estimate, estimated population **(N ± 95% confidnce** intervals) and fish density for each species of trout, at each reach, in **LeClerc** Creek on September **6, 26,** and **28, 1989.**

REACH#: 1 DATE: **9-26-89** LENGTH: **300 ft** MEAN WIDTH: **22.3 ft** AREA **(M^2): 621.5**

SPECIES	#1ST PASS	#2ND PASS	#3RD PASS	#4TH PASS	N	±C.I.	#/100 M2
Brown trout	30	6			37.5	3.7	6.0±0.6
Brook trout	19	6			27.8	6.6	4.5±1.1
Rainbow trout	0	1			≥1		0.2

REACH#: 2 DATE: **9-26-89** LENGTH: **300ft** MEAN WIDTH: **19.8 ft** AREA **(M^2): 550.4**

SPECIES	#1ST PASS	#2ND PASS	#3RD PASS	#4TH PASS	N	±C.I.	#/100 M2
Brown trout	4	0			4	0	0.7±0
Brook trout	10	3			14.3	4.3	2.6±0.8
Rainbow trout	0	1			≥ 1		0.2
Cutthroat trout	6	0			6	0	1.1±0

REACH#: 3 DATE **: 9-28-89** **LENGTH: 300 ft** MEAN WIDTH: **23.4 ft** AREA **(M^2): 650.8**

SPECIES	#1ST PASS	#2ND PASS	#3RD PASS	#4TH PASS	N	±C.I.	#/100 M2
Brown trout	7	2			9.8	3.3	1.5±0.5
Brook trout	23	15			66.1	65.1	10.2±10.0
Cutthroat trout	0	2			≥ 2		0.3

REACH#: 4 DATE: 9-6-89 LENGTH: 200 ft MEAN WIDTH: 13.2 ft AREA **(M^2): 245.3**

SPECIES	#1ST PASS	#2ND PASS	#3RD PASS	#4TH PASS	N	±C.I.	#/100 M2
Brook trout	14	1	5	1	22	2.8	9.0±1.1
Rainbow trout	0	1	0	0	1	0	0.4
Cutthroat trout	0	0	0	1	1	0	0.4

Table B.17. Number of fish caught in each pass of a removal-depletion population estimate, estimated population (N ± 95% confidence intervals), and fish density for each species of trout, at each reach, in Ruby Creek on September 25, 1989.

REACH#: 1 DATE: 9-25-89 LENGTH: 300ft MEAN WIDTH: 16.6 ft AREA (M^2): 462.6

SPECIES	#1ST PASS	#2ND PASS	#3RD PASS	#4TH PASS	N	±C.I.	#/100 M2
Brook trout	20	10			40.0	10.9	8.6±2.4

REACH#: 2 DATE: 9-25-89 LENGTH: 300 ft MEAN WIDTH: 18.5 ft AREA (M^2): 515.6

SPECIES	#1ST PASS	#2ND PASS	#3RD PASS	#4TH PASS	N	±C.I.	#/100 M2
Brown trout	3	3					
Cutthroat Rainbow trout trout	3(1	14			56.3	21.3	10.9±4.1
		0			1		0.2±0.0

REACH%: 3 DATE: 9-25-89 LENGTH: 300 ft MEAN WIDTH: 14.0 ft AREA (M^2): 389.6

SPECIES	#1ST PASS	#2ND PASS	#3RD PASS	#4TH PASS	N	±C.I.	#/100 M2
Brook trout	58	36	23		123.2	6.1	31.6±1.6
Cutthroat trout	0	1			≥ 2		≥ 0.5

REACH#: 4 DATE: 9-25-89 LENGTH: 300 ft MEAN WIDTH: 7.4 ft AREA (M^2): 206.0

SPECIES	#1ST PASS	#2ND PASS	#3RD PASS	#4TH PASS	N	±C.I.	#/100 M2
Brook trout	124	51			210.6	30.8	102.2±15.0

APPENDIX C

GROWTH AND CONDITION FACTORS FOR NON-TARGET SPECIES

Table C.1. Mean back-calculated lengths at the end of each years growth (annulus formation) for each year class of pumpkinseed.

		MEAN±S.D. BACK CALCULATED LENGTH AT ANNULUS							
COHORT	N	1	2	3	4	5	6	7	8
1988	18	50±7.5							
1987	36	54±8.7	77±10.7						
1986	54	53±5.2	75±7.1	93±7.5					
1985	46	52±5.6	71±6.2	91±6.4	108±8.0				
1984	54	50±5.4	68±6.2	85±7.1	102±6.1	116±6.3			
1983	63	49±5.2	64±5.4	80±6.2	96±6.5	111±6.4	124±5.8		
1982	4	53±5.0	68±5.5	82±6.1	96±5.2	110±5.0	126±3.7	138±4.2	
1981	2	46±0.1	61±1.8	77±0.6	94±1.1	109±0.5	122±0.5	135±0.4	148±1.3
GRAND MEAN		N=277 51±6.2	N=259 70±8.3	N=223 87±8.5	N=169 101±8.4	N=123 113±6.7	N=69 124±5.6	N=6 137±3.6	N=2 148±1.3
MEAN ANNUAL GROWTH INCREMENT		51	19	17	14	12	11	13	11

Table C.2. Mean weights, lengths, and condition factors (K_{TL}) for each age class of pumpkinseed.

AGE	N	Mean Weight (g) (± S.D.)	Mean Length (mm) (± S.D.)	Mean K_{TL} (± S.D.)
0+	7	1.6±1.3	37.5±10.3	2.01±0.37
1+	12	3.3±1.4	58.1±8.9	1.92±0.35
2+	34	14.0±8.9	86.6±13.0	1.95±0.36
3+	52	21.3±6.1	101.5±7.7	2.04±0.32
4+	45	31.8±10.2	114.4±8.2	2.06±0.30
5+	52	38.9±7.2	123.4±5.8	2.05±0.23
6+	63	48.2±8.0	131.0±5.7	2.13±0.19
7+	3	77.0±21.8	143.5±4.1	2.29±0.09
8+	2	83.0±1.4	154.0±2.8	2.27±0.09
Total	270			2.05±0.29

Table C.3. Mean back-calculated lengths at the end of each years growth (annulus formation) for each year class of tench.

COHORT	N	MEAN±S.D. BACK CALCULATED LENGTH AT ANNULUS 1	2	3	4	5	6	7	8
1988	10	97±12.7							
1987	8	100±15.5	134±14.6						
1986	7	107±9.5	145±14.1	176±15.0					
1985	11	104±10.8	139±13.7	175±13.3	212±17.2				
1984	15	110±13.3	145±13.9	177±19.3	214±28.3	250±34.1			
1983	19	126±20.7	160±23.0	195±23.8	229±27.1	264±28.7	297±31.4		
1982	10	126±13.1	160±13.8	192±15.1	227±14.2	259±15.5	293±15.2	327±20.2	
1981	4	147±18.5	180±21.0	209±22.8	242±25.5	274±18.9	307±26.7	336±29.0	368±25.9
GRAND MEAN		N=84 114±19.9	N=74 151±20.7	N=66 186±21.9	N=59 223±25.5	N=48 260±28.5	N=33 299±27.3	N=14 334±24.2	N=4 380±25.9
MEAN ANNUAL GROWTH INCREMENT		114	37	35	37	37	39	35	46

Table C.4. Mean weights, lengths, and condition factors (K_{TL}) for each age class of tench.

AGE	N	Mean Weight (g) (± S.D.)	Mean Length (mm) (± S.D.)	Mean K_{TL} (± S.D.)
0+	2	3.3±4.0	57.0±22.2	1.08±0.08
1+	7	27.1±13.3	118.4±18.4	1.50±0.20
2+	6	57.4±21.0	155.1±14.8	1.45±0.21
3+	7	98.6±19.4	188.7±12.2	1.45±0.11
4+	11	178.0±56.3	231.2±20.9	1.41±0.14
5+	12	290.2±116.6	271.3±35.4	1.42±0.09
6+	17	421.9±103.5	316.9±33.1	1.34±0.11
7+	9	593.2±187.0	346.6±18.4	1.32±0.14
8+	4	771.8±107.6	402.3±19.7	1.18±0.07
Total	75			1.38±0.15

Table C.5. Mean back-calculated lengths at the end of each years growth (annulus formation) for each year class of largescale sucker.

COHORT	N	MEAN±S.D. BACK CALCULATED LENGTH AT ANNULUS 1	2	3	4	5	6	7	8	9	10	11
1988	0											
1987	1	157	206									
1986	1	159	207	245								
1985	6	159±12.4	207±20.6	249±20.4	297±22.9							
1984	12	162±11.3	213±17.4	271±28.6	321±33.8	365±33.0						
1983	25	167±12.7	211±12.7	258±15.9	311±24.2	356±24.6	395±22.9					
1982	22	169±11.5	215±15.4	262±17.3	318±38.7	358±20.6	402±21.1	443±21.3				
1981	23	167±13.0	210±13.9	253±14.8	300±18.2	346±24.6	389±26.1	431±25.1	467±21.0			
1980	14	167±18.9	203±18.9	243±16.5	286±17.5	334±20.4	381±21.5	424±20.5	466±16.3	497±20.3		
1979	5	168±33.8	207±34.1	250±30.4	287±26.0	325±21.7	267±19.0	408±19.5	453±10.5	484±21.6	516±16.3	
1978	1	154	193	244	276	323	363	406	453	478	528	550
GRAND MEAN		N=110 166±13.8	N=110 210±16.5	N=109 256±19.8	N=108 306±29.1	N=102 350±26.2	N=90 391±24.3	N=65 432±24.2	N=43 464±18.6	N=20 493±20.7	N=6 518±15.4	N=1 550
MEAN ANNUAL GROWTH INCREMENT		166	44	46	50	44	41	41	32	29	25	32

Table C.6. Mean weights, lengths, and condition factors (K_{TL}) for each age class of largescale sucker.

AGE	N	Mean Weight (g) (± S.D.)	Mean Length (mm) (± S.D.)	Mean K_{TL} (± S.D.)
0+	1	12	103	1.10
1+	0			
2+	1	108	222	0.99
3+	1	168	264	0.91
4+	5	326.8±83.3	319.7±22.3	1.04±0.16
5+	11	570.4±158.7	389.6±32.9	0.94±0.13
6+	22	682.9±132.1	414.6±22.3	0.94±0.08
7+	19	946.7±155.1	461.4±22.0	0.95±0.09
8+	20	1026.3±210.6	483.7±19.5	0.93±0.19
9+	13	1303.2±256.4	505.9±15.3	1.01±0.15
10+	5	1335.4±214.0	522.0±23.3	0.94±0.08
11+	1	1435	550	0.86
Total	99			0.95±0.13

Table C.7. Mean back-calculated lengths at the end of each years growth (annulus formation) for each year class of longnose sucker.

		MEAN±S.D. BACK CALCULATED LENGTH AT ANNULUS						
COHORT	N	1	2	3	4	5	6	7
1988	1	129						
1987	2	132±6.5	170±3.7					
1986	1	193	267	317				
1985	18	166±20.1	218±24.0	274±24.6	324±27.3			
1984	55	168±18.9	221±22.7	275±22.7	329±20.5	376±24.6		
1983	14	149±18.2	193±24.5	248±35.1	293±36.4	342±40.9	381±39.6	
1982	3	144±6.9	191±20.3	235±17.9	285±8.4	326±7.1	363±5.4	383±11.7
GRAND MEAN		N=94 163±20.8	N=93 215±26.3	N=91 270±27.7	N=90 321±28.3	N=72 367±32.0	N=17 377±36.4	N=3 383±11.7
MEAN ANNUAL GROWTH INCREMENT		163	52	55	51	46	10	6

Table C.8. Mean weights, lengths, and condition factors (K_{TL}) for each age class of longnose sucker.

AGE	N	Mean Weight (g) (± S.D.)	Mean Length (mm) (± S.D.)	Mean K_{TL} (± S.D.)
0+	4	7.3±1.0	92.0±4.2	0.93±0.12
1+	1	25	141	0.89
2+	2	59.0±15.6	184.0±15.6	0.94±0.01
3+	1	393	335	1.05
4+	15	438.7±95.1	345.1±26.3	1.06±0.12
5+	44	602.2±144.3	395.7±26.5	0.98±0.11
6+	14	577.4±122.2	390.4±34.8	0.97±0.11
7+	3	596.7±100.7	383.3±11.7	1.05±0.09
Total				0.99±0.11

Table C.9. Mean back-calculated lengths at the end of each years growth (annulus formation) for each year class of squawfish.

		MEAN±S.D. BACK CALCULATED LENGTH AT ANNULUS									
COHORT	N	1	2	3	4	5	6	7	8	9	10
1988	1	90									
1987	5	116±13.9	162±12.2								
1986	43	119±20.5	168±21.7	211±23.1							
1985	23	110±16.3	161±19.3	212±28.2	256±33.6						
1984	7	93±7.2	141±15.9	183±18.2	224±23.9	264±32.6					
1983	2	129±38.4	193±15.0	249±1.9	313±21.4	370±23.8	423±31.6				
1982	0										
1981	0										
1980	3	118±19.2	170±24.2	234±42.2	281±33.1	325±38.5	381±39.6	441±16.2	504±5.3	545±13.4	
1979	1	154	206	258	317	376	443	502	539	576	613
GRAND MEAN		N=85 115±20.1	N=84 165±21.8	N=79 211±27.2	N=36 257±37.8	N=13 303±55.0	N=6 405±39.8	N=0 456±33.2	N=0 513±18.2	N=0 553±19.1	N=1 613
MEAN ANNUAL GROWTH INCREMENT		115	50	46	46	46	102	51	57	40	60

Table C.10. Mean weights, lengths, and condition factors (K_{TL}) for each age class of squawfish.

AGE	N	Mean Weight (g) (± S.D.)	Mean Length (mm) (± S.D.)	Mean K_{TL} (± S.D.)
0+	1	2	54	1.27
1+	1	8	104	0.71
2+	3	49.8±13.1	194.8±15.3	0.74±0.05
3+	39	91.2±30.9	231.2±24.1	0.71±0.05
4+	20	160.0±49.2	282.0±31.9	0.75±0.09
5+	7	176.6±53.4	284.9±31.8	0.75±0.04
6+	1	698	445.5±30.4	0.92
9+	2	1466.3±327.1	559.3±22.5	1.00±0.02
10+	1	2825	628	1.14
Total	75			0.75±0.11

Table C.11. Mean back-calculated lengths at the end of each years growth (annulus formation) for each year class of peamouth.

COHORT	N	MEAN±S.D. BACK CALCULATED LENGTH AT ANNULUS 1	2	3	4	5	8
1988	1	105					
1987	2	155±5.6	187±13.8				
1986	10	164±10.9	204±14.5	244±19.1			
1985	6	165±16.7	196±11.3	228±10.4	259±14.3		
1984	1	175	206	241	277	312	
1983	1	140	162	192	218	240	266
GRAND MEAN		N=21 160±18.1	N=20 198±15.7	N=18 236±20.1	N=8 256±20.5	N=2 276±50.7	N=1 266
MEAN ANNUAL GROWTH INCREMENT		160	38	38	20	20	-10

Table C.12. Mean weights, lengths, and condition factors (K_{TL}) for each age class of peamouth.

AGE	N	Mean Weight (g) (± S.D.)	Mean Length (mm) (± S.D.)	Mean K_{TL} (± S.D.)
1+			107	
2+	2	52.5±30.4	196.5±19.1	0.65±0.21
3+	9	122.4±38.0	259.1±19.3	0.75±0.10
4+	5	125.7±31.5	276.2±17.0	0.64±0.05
5+	1	283	334	0.76
6+	1	190	281	0.86
TotaL	18			0.71±0.11

APPENDIX D

MONTHLY BENTHIC MACROINVERTEBRATE DENSITIES IN THE PEND OREILLE RIVER AND TRIBUTARIES

Table D.1. Mean number (± standard deviation) of benthic macroinvertebrates per square meter in the Pend Oreille River at each study site for March, 1989.

	SITE 1	SITE 2	SITE 3	SITE 4	SITE 5	SITE 6	SITE 7	SITE 8	SITE 9	SITE 10	SITE 11
TRICHOPTERA											
Hydroptilidae	189 ± 327			126 ± 218		63 ± 109				315 ± 393	
Polycentropodidae			63 ± 109	503 ± 576	63 ± 109		189 ± 327	252 ± 436	63 ± 109	126 ± 109	
T. pupae											63 ± 109
EPHEMEROPTERA											
Tricorythidae			315 ± 545	63 ± 109		189 ± 327		315 ± 545	63 ± 109		252 ± 288
Baetidae							63 ± 109			63 ± 109	
Ephemerellidae						63 ± 109	63 ± 109				
Heptageniidae										63 ± 109	
COLEOPTERA										63 ± 109	
Elmidae larvae		440 ± 763	252 ± 288	315 ± 545	1132 ± 980	503 ± 475	629 ± 393	440 ± 475	63 ± 109	252 ± 109	1069 ± 1852
Elmidae adults		63 ± 109									
DIPTERA											
Chironomidae larvae	1887 ± 2223	1509 ± 1051	2516 ± 2576	6667 ± 1365	2264 ± 2288	4465 ± 3964	6289 ± 10242	5535 ± 8941	3648 ± 5835	1887 ± 1132	6352 ± 5566
Chironomidae pupae		63 ± 109		126 ± 109							
Ceratopogonidae	126 ± 218	63 ± 109	629 ± 576		63 ± 109		126 ± 109	440 ± 475			
Tipulidae									189 ± 0	252 ± 436	629 ± 663
Simuliidae									63 ± 109		
Empididae					126 ± 218				63 ± 109	252 ± 436	
Psychodidae	63 ± 109							189 ± 189	63 ± 109		63 ± 109
ODONATA											
Coenagrionidae				63 ± 109							
HYDRACARINA	189 ± 189		63 ± 109	63 ± 109				126 ± 218			126 ± 218
AMPHIPODA						126 ± 218	189 ± 327	126 ± 218	126 ± 2158	63 ± 109	63 ± 109
Talitridae	503 ± 872										
ANNELIDA		189 ± 189	503 ± 576	315 ± 109	189 ± 189	755 ± 680	440 ± 288	503 ± 872	63 ± 109	377 ± 327	440 ± 763
Hirudinealidae	943 ± 681	1132 ± 716	4654 ± 5283	2767 ± 3220	4780 ± 4475	1572 ± 2253	2013 ± 1706	1258 ± 1040	3522 ± 4965	818 ± 934	3145 ± 2533
PLATYHELMINTHES			63 ± 109			63 ± 109	63 ± 109		189 ± 327		63 ± 109
Planariidae				189 ± 189	63 ± 109	63 ± 109	126 ± 109				
NEMATODA		63 ± 109	692 ± 663	63 ± 109	126 ± 218						189 ± 327
MOLLUSCA							63 ± 109	126 ± 218	252 ± 438	189 ± 327	126 ± 218
Planorbidae	1635 ± 2513	1006 ± 475	629 ± 1089	440 ± 392	881 ± 1365	566 ± 822	629 ± 475	1572 ± 1441	63 ± 109	566 ± 822	943 ± 865
Lymnaeidae		126 ± 109		252 ± 436	189 ± 327		63 ± 109			126 ± 109	
Sphaeriidae		440 ± 763	1132 ± 1178	1132 ± 1498	189 ± 0	629 ± 663	692 ± 109	692 ± 436	315 ± 545	818 ± 1106	1132 ± 998
TOTALS	5535	5095	11,510	13,082	10,063	9057	11,636	11,573	8742	6227	14,654

Table D.2. Mean number (± standard deviation) of benthic macroinvertebrates per square meter in the Pend Oreille River at each study site for April, 1989.

	SITE 1	SITE 2	SITE 3	SITE 4	SITE 5	SITE 6	SITE 7	SITE 8	SITE 9	SITE 10	SITE 11
TRICHOPTERA											
Leptoceridae		126 ± 218	63 ± 109	126 ± 109		755 ± 1307				63 ± 109	126 ± 218
Hydroptilidae	126 ± 109	126 ± 218	1076 ± 1384	252 ± 288	126 ± 218	566 ± 822				63 ± 109	63 ± 109
Polycentropodidae		189 ± 327	63 ± 109	63 ± 109		126 ± 109			63 ± 109		
EPHEMEROPTERA											
Tricorythidae	2138 ± 3226	189 ± 327	2767 ± 3709	377 ± 327	566 ± 327	315 ± 109		126 ± 218	126 ± 218		189 ± 327
Ephemeridae	63 ± 109										
COLEOPTERA											
Elmidae larvae	189 ± 327	63 ± 109	226 ± 248	774 ± 803	440 ± 393	1258 ± 851	881 ± 1525	566 ± 499	377 ± 654	289 ± 407	63 ± 109
Elmidae adults	63 ± 109			6 ± 11							
DIPTERA											
Chironomidae larvae	5409 ± 2617	3585 ± 3118	9453 ± 8970	3585 ± 3224	1006 ± 763	1698 ± 499	692 ± 892	1006 ± 475	956 ± 1034	2516 ± 4357	1572 ± 2251
Chironomidae pupae	252 ± 436	63 ± 109	315 ± 288	63 ± 109	63 ± 109	252 ± 288	126 ± 218		126 ± 218	503 ± 872	
Ceratopogonidae	440 ± 475		516 ± 560	189 ± 189	252 ± 288	440 ± 109	2013 ± 3486	189 ± 189		126 ± 218	
Simuliidae						63 ± 109				63 ± 109	
Empididae			76 ± 100	126 ± 218	126 ± 218	503 ± 714					
ODONATA											
Coenagrioniidae	63 ± 109		126 ± 218	126 ± 218	189 ± 189					189 ± 327	63 ± 109
HYDRACARINA	1321 ± 680	63 ± 109	566 ± 499	987 ± 878	755 ± 566	1635 ± 607	63 ± 109	377 ± 499	63 ± 109	818 ± 1416	692 ± 1198
AMPHIPODA											
Talitridae	440 ± 607	377 ± 327	1509 ± 2614	1101 ± 877	1384 ± 892	1132 ± 680	755 ± 998	252 ± 109	76 ± 100	63 ± 109	3522 ± 6100
ANNELIDA											
Lumbriculidae	4277 ± 1879	1258 ± 1665	252 ± 436	1138 ± 1063	4277 ± 3510	1761 ± 1246	2013 ± 1863	3899 ± 4624	1346 ± 1950	447 ± 757	126 ± 218
Hirudinea			63 ± 109		63 ± 109						63 ± 109
PLATYHELMINTHES											
Planariidae				63 ± 109	63 ± 109	189 ± 189					63 ± 109
NEMATODA	189 ± 327	126 ± 218	881 ± 607	459 ± 416		440 ± 475	63 ± 109	377 ± 189	252 ± 218	63 ± 109	315 ± 393
MOLUSCA											
Planorbidae	440 ± 607	566 ± 654	315 ± 288	82 ± 97	1509 ± 1132	1258 ± 1106	63 ± 109	189 ± 189	566 ± 499	252 ± 436	252 ± 436
Lymnaeidae		126 ± 218	13 ± 22	132 ± 213	126 ± 218	378 ± 654	189 ± 327	63 ± 109	629 ± 1089	252 ± 436	
Sphaeriidae	189 ± 327	377 ± 377	189 ± 189	723 ± 1172	1824 ± 663	3019 ± 1970	377 ± 499	503 ± 872	189 ± 189		1887 ± 2792
TERRESTRIAL INSECTS	63 ± 109			6 ± 11	126 ± 109	63 ± 109					
TOTALS	15,661	7233	20,635	10,390	12,893	15,850	7233	7547	4767	5705	8994

Table D.3. Mean number (± standard deviation) of benthic macroinvertebrates per square meter in the Pend Oreille River at each study site for June, 1989.

	SITE 1	SITE 2	SITE 3	SITE 4	SITE 5	SITE 6	SITE 7	SITE 8	SITE 9	SITE 10	SITE 11
TRICHOPTERA											
Leptoceridae	63 ± 109		63 ± 109	63 ± 109	755 ± 1148		126 ± 218			126 ± 218	
Hydroptilidae	126 ± 109		63 ± 109	63 ± 109		440 ± 475	126 ± 218				
Polycentropodidae					63 ± 109						
EPHEMEROPTERA											
Tricorythidae	201 ± 317	126 ± 218	63 ± 109	503 ± 576	126 ± 218	189 ± 189	377 ± 499	755 ± 1307	1635 ± 2671	692 ± 1039	126 ± 218
Ephemeridae	63 ± 109										
COLEOPTERA											
Elmidae larvae	503 ± 872	63 ± 109	63 ± 109	63 ± 109	377 ± 327	252 ± 288	943 ± 1321	126 ± 109	315 ± 545	126 ± 218	
Elmidae adults	189 ± 189		63 ± 109	63 ± 109							
DIPTERA											
Chironomidae larvae	2057 ± 2962	440 ± 607	1195 ± 763	1887 ± 2621	377 ± 189	1447 ± 1513	1270 ± 1307	1006 ± 892	1887 ± 2614	943 ± 822	189 ± 327
Chironomidae pupae	327 ±534	63 ± 109		252 ± 218			6 ± 11		126 ± 218	126 ± 109	63 ± 109
Ceratopogonidae	333 ± 529	189 ± 189	503 ± 576	692 ± 1039	126 ± 109	503 ± 576	767 ± 1297	755 ± 755	1132 ± 822	252 ± 288	
Tipulidae								252 ± 288	63 ± 109		
Simuliidae	63 ± 109		63 ± 109	63 ± 109	63 ± 109			126 ± 218	126 ± 109		
Psychodidae			189 ± 189								
Empididae					63 ± 109	63 ± 109					
ODONATA											
Coenagrioniidae	6 ± 11	189 ± 189					63 ± 109		63 ± 109	189 ± 327	
HYDRACARINA	321 ± 278		1258 ± 1089	1447 ± 1256	189 ± 189	692 ± 663	270 ± 420	629 ± 663	1572 ± 1039	1069 ± 950	315 ± 288
AMPHIPODA											
Talitridae	396 ± 349	126 ± 218	189 ± 189		377 ± 377	189 ± 189	1258 ± 1325	189 ± 189	1258 ± 1441	755 ± 865	
ANNELIDA											
Lumbriculidae	730 ± 849	881 ± 786	3208 ± 4172	4654 ± 6949	881 ± 950	1069 ± 950	1648 ± 1796	1572 ± 1391	440 ± 436	2767 ± 3068	377 ± 499
PLATYHELMINTHES											
Planariidae			629 ± 1089				69 ± 104				
NEMATODA	63 ± 109		1258 ± 1441	7673 ± 11850	377 ± 654	503 ± 436	390 ± 485	252 ± 436	629 ± 663	440 ± 763	
MOLLUSCA											
Planorbidae	333 ± 529		1132 ± 1800	440 ± 607	63 ± 109	1258 ± 2179	1642 ± 2204	63 ± 109	63 ± 109	189 ± 327	2076 ± 3595
Lymnaeidae				189 ± 327	63 ± 109		132 ± 213		126 ± 109		440 ± 763
Sphaeriidae	132 ± 98	252 ± 436	818 ± 931	377 ± 377	315 ± 545	377 ± 327	629 ± 931	440 ± 763	315 ± 393	126 ± 109	63 ± 109
TERRESTRIAL INSECTS	6 ± 11		126 ± 109			189 ± 327	126 ± 377	189 ± 189		126 ± 218	126 ± 218
TOTALS	5912	2327	10,944	18,428	4214	7170	9843	6352	9749	7925	3774

Table D.4. Mean number (± standard deviation) of benthic macroinvertebrates per square meter in the Pend Oreille River at each study site for July, 1989.

	SITE 1	SITE 2	SITE 3	SITE 4	SITE 5	SITE 6	SITE 7	SITE 8	SITE 9	SITE 10	SITE 11
TRICHOPTERA											
Leptoceridae					63 ± 109					63 ± 109	
Hydroptilidae	189 ± 327	1572 ± 2723	126 ± 218	252 ± 218	126 ± 109	63 ± 109	126 ± 109	377 ± 377			189 ± 189
Limnephilidae	63 ± 109										
EPHEMEROPTERA											
Tricorythidae		63 ± 109		126 ± 109		189 ± 0	126 ± 109	377 ± 327	63 ± 109	126 ± 218	
Leptophlebiidae	63 ± 109					63 ± 109					
COLEPTERA											
Elmidae larvae				566 ± 980	126 ± 218	818 ± 1256		692 ± 763		189 ± 189	63 ± 109
Hydrophilidae		63 ± 109									
DIPTERA											
Chironomidae larvae	1321 ± 943	1698 ± 1544	1761 ± 2730	818 ± 288	1258 ± 663	1761 ± 663	1384 ± 1783	2138 ± 2603	11132 ± 998	377 ± 189	818 ± 475
Chironomidae pupae	126 ± 109	189 ± 189	503 ± 714		63 ± 109	63 ± 109	315 ± 288			126 ± 218	126 ± 109
Ceratopogonidae			63 ± 109	377 ± 327	315 ± 109	881 ± 1365	63 ± 109	252 ± 436		63 ± 109	126 ± 109
Simuliidae					377 ± 654			63 ± 109		126 ± 109	
Empididae					63 ± 109						
ODONATA											
Coenagrioniidae						63 ± 109	63 ± 109				
HYDRACARINA		189 ± 327	503 ± 545	252 ± 436	440 ± 109	1761 ± 1899	566 ± 566	252 ± 288	692 ± 393	755 ± 499	503 ± 438
AMPHIPODA											
Talitridae	503 ± 545	63 ± 109	440 ± 763	2013 ± 1890	881 ± 1213	2138 ± 3704	755 ± 377	377 ± 377	692 ± 714	881 ± 545	189 ± 327
ANNELIDA											
Lumbriculidae	3962 ± 2642	377 ± 327	943 ± 327	692 ± 475	566 ± 189	755 ± 189	1447 ± 1325	629 ± 931	1069 ± 950	881 ± 1365	189 ± 189
Hirudinea						63 ± 109	252 ± 218	189 ± 327			
NEMATODA			252 ± 436	503 ± 545	189 ± 0	63 ± 109	63 ± 109		63 ± 109	63 ± 109	
MOLLUSCA											
Planorbidae	126 ± 218	63 ± 109	189 ± 189	126 ± 109	63 ± 109		252 ± 288	63 ± 109	126 ± 218	315 ± 393	
Lymnaeidae						63 ± 109				63 ± 109	
Sphaeriidae	189 ± 189	63 ± 109	440 ± 763	881 ± 763	2579 ± 786	1698 ± 755	1761 ± 1284	1195 ± 1256	2704 ± 4195	1006 ± 288	503 ± 393
TERRESTRIAL INSECTS			63 ± 109		63 ± 109	189 ± 327					
TOTALS	**6541**	**4340**	**5283**	**6667**	**7170**	**10629**	**7170**	**6604**	**6541**	**5032**	**2704**

Table D.5. Mean number (± standard deviation) of benthic macroinvertebrates per square meter in the Pend Oreille River at each study site for September, 1989.

	SITE 1	SITE 2	SITE 3	SITE 4	SITE 5	SITE 6	SITE 7	SITE 8	SITE 9	SITE 10	SITE 11
TRLeptoceridae	63 ± 109										
			315 ± 545	63 ±							
Hydroptilidae			377 ± 499	126 ± 109	126 ± 109	315 ± 218	126 ± 109	126 ± 218	189 ± 327	2138 ± 1852	63 ± 109
Polycentropodidae			63 ± 109		63 ± 109	126 ± 109	189 ± 189	126 ± 109		63 ± 109	
Phryganeidae							63 ± 109				
Rhyacophilidae		6 ± 11									
EPHEMEROPTERA											
Tricorythidae	126 ± 218		692 ± 892	1698 ± 1800	1509 ± 1677	10189 ± 15389	1761 ± 2070	1761 ± 1571	3648 ± 6318	26226 ± 27594	881 ± 1213
Baetidae			315 ± 545	692 ± 1039		1258 ± 2179	440 ± 475	126 ± 109	252 ± 436	63 ± 109	126 ± 218
COLEPTERA											
Elmidae larvae	63 ± 109	31 ± 55	252 ± 436	943 ± 1321	189 ± 327	1321 ± 1425	943 ± 1321	189 ± 189	440 ± 763	2704 ± 2251	1006 ± 1284
Elmidae adults	63 ± 109							63 ± 109	189 ± 327	252 ± 436	
DIPTERA											
Chironomidae	692 ± 393	63 ± 109	4591 ± 6537	6541 ± 4109	1824 ± 2684	4340 ± 3644	6730 ± 6537	5535 ± 6741	3145 ± 4638	8491 ± 7498	3019 ± 2126
Chironomidae pupae				63 ± 109	63 ± 109	503 ± 475	63 ± 109	189 ± 189	126 ± 218	943 ± 499	
Ceratopogonidae	126 ± 218		126 ± 109	63 ± 109		189 ± 327	377 ± 654	252 ± 218	189 ± 327	315 ± 393	126 ± 218
Tipulidae				126 ± 109			189 ± 327	126 ± 218		63 ± 109	
Simuliidae			63 ± 109			315 ± 545				252 ± 288	
Empididae			63 ± 109	126 ± 218		63 ± 109	126 ± 218	126 ± 218	63 ± 109		63 ± 109
ODONATA											
Coenagrioniidae	63 ± 109			63 ± 109		189 ± 327	63 ± 109		566 ± 980	3208 ± 3019	1132 ± 1961
Macromiidae			63 ± 109					126 ± 218			
HYDRACARINA	189 ± 189	201 ± 317	1443 ± 388	566 ± 499	881 ± 663	1060 ± 851	1572 ± 1256	2516 ± 2576	440 ± 218		503 ± 288
AMPHIPODA											
ANNELIDAae	1006 ± 1429	189 ± 327	1950 ± 2750	2516 ± 3878	6289 ± 8794	5660 ± 4992	2013 ± 1783	3396 ± 3106	1887 ± 3268	11195 ± 9278	1006 ± 1429
Hirudinealidae	1509 ± 1800	6 ± 11	629 ± 109	2893 ± 2433	2138 ± 2730	3962 ± 5607	2327 ± 2603	1509 ± 822	1132 ± 1645	2013 ± 1813	1195 ± 1256
PLATYHELMINTHES				63 ± 109	189 ± 327		63 ± 109	189 ± 189			
			440 ± 393	126 ± 218	189 ± 327						
Planariidae	63 ± 109					252 ± 288					
NEMATODA	189 ± 189	38 ± 50	943 ± 654	881 ± 1365	818 ± 1416	692 ± 475	1132 ± 1237	440 ± 288	63 ± 109	440 ± 475	
MOLLUSCA							1069 ± 1256	943 ± 0	881 ± 1365	126 ± 218	440 ± 607
Planorbidae	1635 ± 2344	371 ± 334	5535 ± 6918	1824 ± 1649	629 ± 218	4906 ± 3274	3837 ± 2491	1824 ± 2251	2893 ± 3027	7296 ± 5786	755 ± 980
Lymnaeidae	126 ± 109	195 ± 322	1761 ± 3050	63 ± 109	440 ± 763	189 ± 189		126 ± 218	315 ± 288	629 ± 663	63 ± 109
Sphaeriidae	377 ± 327	170 ± 182	2642 ± 3788	3459 ± 1833	1384 ± 1325	3962 ± 4895	4654 ± 3182	1635 ± 2070	126 ± 109	5535 ± 5223	1824 ± 1365
TERRESTRIALINSECTS			63 ± 109	126 ± 218	126 ± 109	315 ± 397	189 ± 189	189 ± 189	126 ± 218		63 ± 109
TOTALS	6289	1271	22327	23019	16855	39812	27925	21509	16667	71950	12264

Table D.6. Mean number (± standard deviation) of benthic macroinvertebrates per square meter in the Pend Oreille River at each study site for October, 1989.

	SITE 1	SITE 2	SITE 3	SITE 4	SITE 5	SITE 6	SITE 7	SITE 8	SITE 9	SITE 10	SITE 11
TRICHOPTERA											
Leptoceridae	63 ± 109	126 ± 218	189 ± 189	63 ± 109	315 ± 288	252 ± 218	755 ± 998	189 ± 189	943 ± 1321	189 ± 189	252 ± 436
Hydroptilidae	63 ± 109		126 ± 109	315 ± 545	315 ± 288	126 ± 218	377 ± 499	440 ± 607	126 ± 218	126 ± 218	
Polycentropodidae							63 ± 109				126 ± 218
Phryganeidae					63 ± 109		63 ± 109				
EPHEMEROPTERA											
Tricorythidae	126 ± 109	755 ± 654	3270 ± 2931	63 ± 109	755 ± 654	23585 ± 34927	3899 ± 4174	1258 ± 1441	692 ± 663	1006 ± 950	1887 ± 1425
Baetidae		503 ± 288	629 ± 607		189 ± 327	377 ± 499	126 ± 218	63 ± 109			252 ± 436
Heptageniidae	63 ± 109										
COLEOPTERA											
Elmidae larvae	252 ± 436	63 ± 109	63 ± 109	63 ± 109	63 ± 109	189 ± 189	63 ± 109	1132 ± 1961	63 ± 109	1572 ± 2723	1195 ± 1284
Elmidae adults					63 ± 109	252 ± 436				63 ± 109	189 ± 1284
DIPTERA											
Chironomidae larvae	755 ± 499	1447 ± 892	9874 ± 8668	2830 ± 2295	23648 ± 39171	10440 ± 10978	6793 ± 4935	2076 ± 1858	1006 ± 950	4214 ± 3215	2579 ± 2121
Ceratopogonidae	126 ± 218	377 ± 377	315 ± 288	252 ± 109	377 ± 654	1572 ± 1429		377 ± 654	63 ± 109	252 ± 109	63 ± 109
Tipulidae					126 ± 109	63 ± 109					
Simuliidae		126 ± 218			943 ± 1634	63 ± 109	1698 ± 2779		3082 ± 2677		
Empididae			63 ± 109		126 ± 218	818 ± 763	881 ± 1525	315 ± 545	189 ± 189	63 ± 109	63 ± 109
ODONATA											
Coenagrionidae	377 ± 377		189 ± 327		566 ± 980	692 ± 892	692 ± 1039	252 ± 436	63 ± 109	63 ± 109	566 ± 499
Macromiidae		63 ± 109			126 ± 109						
HYDRACARINA	503 ± 109	629 ± 393	189 ± 0	315 ± 288	1132 ± 822	2767 ± 2018	1635 ± 1890	692 ± 763	2264 ± 3922	566 ± 327	1447 ± 1391
AMPHIPODA											
Talitridae	1195 ± 892	5031 ± 2882	7610 ± 6783	3522 ± 3068	14780 ± 20541	11195 ± 9378	4340 ± 3585	4088 ± 3747	252 ± 218	7359 ± 10329	7296 ± 8242
ANNELIDA											
Lumbriculidae	881 ± 663	881 ± 786	1509 ± 1729	1132 ± 654	566 ± 566	2579 ± 2235	1006 ± 436	440 ± 475	189 ± 189	1069 ± 1365	1384 ± 892
Hirudinea		252 ± 218	252 ± 436			63 ± 109	189 ± 327			63 ± 109	
PLATYHELMINTHES											
Planariidae	63 ± 109	315 ± 393			881 ± 663	1384 ± 1416	881 ± 763	126 ± 218	1132 ± 1645	566 ± 566	63 ± 109
NEMATODA	252 ± 436		440 ± 763	377 ± 499	377 ± 499	1132 ± 654	63 ± 109	189 ± 327	63 ± 109	189 ± 327	63 ± 109
MOLLUSCA											
Planorbidae	377 ± 377	2201 ± 2389	3082 ± 3780	755 ± 1148	818 ± 1106	2516 ± 2826	2390 ± 3817	1447 ± 2187	1509 ± 2126	629 ± 218	2201 ± 1441
Lymnaeidae		63 ± 109	189 ± 327	315 ± 288	63 ± 109	189 ± 189			63 ± 109	440 ± 393	189 ± 189
Sphaeriidae	377 ± 654	1132 ± 680	2013 ± 892	1384 ± 950	1384 ± 1466	1195 ± 576	503 ± 475	4277 ± 5850	692 ± 663	1447 ± 1256	4088 ± 4345
TERRESTRIAL INSECTS		63 ± 109			63 ± 109	126 ± 218	63 ± 109	63 ± 109	252 ± 109	63 ± 109	
TOTALS	**5472**	**14025**	**30000**	**11384**	**47736**	**61573**	**26478**	**17422**	**12642**	**19937**	**23900**

Table D.7. Mean number (± standard deviation) of macroinvertebrates per square meter in Cee Cee Ah Slough (site 3A), 1989.

	APRIL	JUNE	JULY	SEPTEMBER	OCTOBER	MEAN	% ABUND
TRICHOPTERA							
Leptoceridae	6 ± 11				6 ± 11	2.5	< 0.1
Hydroptilidae			126 ± 109			25.2	0.3
Polycentropodidae	195 ± 322			189 ± 189	38 ± 65	84.3	1.0
Limnephilidae	201 ± 316					40.3	0.5
EPHEMEROPTERA							
Tricorythidae		126 ± 109	63 ± 109	1447 ± 1339	88 ± 153	344.7	4.1
Baetidae	509 ± 866		63 ± 109	189 ± 189	6 ± 11	153.5	1.8
COLEOPTERA							
Elmidae	82 ± 97			315 ± 393		79.3	0.9
DIPTERA							
Chironomidae larvae	2767 ± 3493	1887 ± 1961	1698 ± 998	5472 ± 2594	686 ± 895	2501.9	29.8
Chironomidae pupae	25 ± 44		63 ± 109	315 ± 545		80.5	1.0
Ceratopogonidae	654 ± 325	189 ± 327	126 ± 109	692 ± 109		332.1	4.0
Empididae				63 ± 109		12.6	0.2
ODONATA							
Coenagrionidae	31 ± 29			189 ± 189	31 ± 55	50.3	0.6
HYDRACARINA	472 ± 574		126 ± 109	1572 ± 2235	145 ± 204	462.9	5.5
AMPHIPODA							
Talitridae		126 ± 218	252 ± 288	2830 ± 2467	434 ± 425	728.3	8.7
ANNELIDA							
Lumbriculidae	1981 ± 749	1132 ± 0	503 ± 436	5283 ± 377	516 ± 455	1883.0	22.5
PLATYHELMINTHES							
Planariidae	6 ± 11					1.3	< 0.1
NEMATODA	1151 ± 167	315 ± 288				293.1	3.5
MOLLUSCA							
Planorbidae	283 ± 409	315 ± 288	189 ± 327	2390 ± 3009	44 ± 76	644.0	7.7
Lymnaeidae	509 ± 690				25 ± 44	106.9	1.3
Sphaeriidae	359 ± 344	566 ± 822			1560 ± 932	496.8	5.9
TERRESTRIAL INSECTS		189 ± 0		126 ± 109		62.9	0.8
TOTALS	9233	4843	3208	21069	3579	8386.2	

Table D.8. Mean number (± standard deviation) of macroinvertebrates per square meter in Dike Slough (site 4A), 1989.

	APRIL	JUNE	JULY	SEPTEMBER	OCTOBER	MEAN	% ABUND
TRICHOPTERA							
Leptoceridae	126 ± 218	63 ± 109			63 ± 109	50.3	0.2
Hydroptilidae		189 ± 327	126 ± 218	629 ± 607	377 ± 377	264.2	1.2
EPHEMEROPTERA							
Tricorythidae		63 ± 109	315 ± 393	2021 ± 607	1887 ± 499	893.1	3.9
Baetidae	1447 ± 1153			189 ± 189	629 ± 663	452.8	2.0
COLEOPTERA							
Elmidae larvae	189 ± 189		126 ± 218			62.9	0.3
Elmidae adults	189 ± 189					37.7	0.2
DIPTERA							
Chironomidae larvae	8176 ± 9205	881 ± 288	1258 ± 475	13208 ± 18978	7547 ± 5757	6213.8	27.4
Chironomidae pupae	189 ± 327	63 ± 109		1258 ± 950		301.9	1.3
Ceratopogonidae	2076 ± 1800	63 ± 109	189 ± 189	1195 ± 1039	189 ± 0	742.2	3.3
Tipulidae	126 ± 109					25.2	0.1
Empididae				126 ± 218	63 ± 109	37.7	0.2
Chaoboridae		63 ± 109		63 ± 109		25.2	0.1
ODONATA							
Coenagrioniidae	252 ± 288			943 ± 943	252 ± 109	289.3	1.3
Corduliidae				126 ± 218		25.2	0.1
HYDRACARINA	2579 ± 2359	943 ± 1178	755 ± 566	2013 ± 1813	3459 ± 576	1949.7	8.6
AMPHIPODA							
Talitridae			566 ± 499	2201 ± 436	4151 ± 2941	1383.6	6.1
ANNELIDA							
Lumbriculidae	15975 ± 11220	1132 ± 998	2830 ± 2552	7233 ± 8614	1321 ± 1148	5698.1	25.2
NEMATODA	10063 ± 10879				63 ± 109	2025.2	8.9
MOLLUSCA							
Planorbidae	2076 ± 1178	63 ± 109	315 ± 393	1887 ± 2126	4088 ± 5304	1685.6	7.4
Lymnaeidae	63 ± 109			1321 ± 2288	63 ± 109	289.3	1.3
Sphaeriidae	629 ± 393					125.8	0.6
TERRESTRIALINSECTS		63 ± 109		252 ± 288		62.9	0.3
TOTALS	44,151	3585	6478	34,843	24,151	22,641.6	

Table D.9. Mean number (± standard deviation) of macroinvertebrates per square meter (collected by drift sample) in Pow Wow Slough (site 5A), 1989.

	APRIL	JUNE	JULY	SEPTEMBER	OCTOBER	MEAN	% ABUND
TRICHOPTERA							
Leptoceridae					126 ± 128	25.2	0.1
Hydroptilidae	818 ± 1416		881 ± 763	692 ± 545	63 ± 109	490.6	1.7
Polycentropodidae				63 ± 109		12.6	< 0.1
Phryganeidae				63 ± 109		12.6	< 0.1
EPHEMEROPTERA							
Tricorythidae				1195 ± 1153	252 ± 288	289.3	1.0
Baetidae	63 ± 109			63 ± 109		25.2	0.1
COLEOPTERA							
Elmidae	252 ± 288		63 ± 109			62.9	0.2
Dytiscidae			63 ± 109			12.6	< 0.1
DIPTERA							
Chironomidae larvae	2704 ± 2576	818 ± 786	4214 ± 5099	23333 ± 12581	8994 ± 5541	8012.6	27.6
Chironomidae pupae	440 ± 763	126 ± 218	63 ± 109			125.8	0.4
Ceratopogonidae	1132 ± 822	377 ± 189	126 ± 109	440 ± 436	126 ± 218	440.3	1.5
Simuliidae			63 ± 109			12.6	< 0.1
Empididae				126 ± 218		25.2	0.1
Chaoboridae					126 ± 218	25.2	0.1
ODONATA							
Coenagrioniidae	126 ± 218			2013 ± 1890	1069 ± 1137	641.5	2.2
Corduliidae				189 ± 189		37.7	0.1
HYDRACARINA	1006 ± 1106	503 ± 475	315 ± 109	2704 ± 1213	1447 ± 393	1195.0	4.1
AMPHIPODA							
Talitridae		63 ± 109	2579 ± 2562	2642 ± 3317	629 ± 786	1182.4	4.1
ANNELIDA							
Lumbriculidae	6541 ± 4109	1950 ± 3050	4843 ± 5450	3899 ± 1525	503 ± 436	3547.2	12.2
PLATYHELMINTHES							
Planariidae			63 ± 109		126 ± 218	37.7	0.1
NEMATODA	51761 ± 45148	2013 ± 1783	315 ± 545			10817.6	37.3
MOLLUSCA							
Planorbidae	1321 ± 1634	126 ± 218	943 ± 1321	1950 ± 1153	4214 ± 6156	1710.7	5.9
Lymnaeidae				189 ± 327	63 ± 109	50.3	0.2
Sphaeriidae		63 ± 109	189 ± 189		63 ± 109	62.9	0.2
TERRESTRIAL INSECTS			440 ± 218	189 ± 189	126 ± 109	151.0	0.5
TOTALS	66,164	6038	15,157	39,749	17,925	29,006.4	

Table D.10. Mean number (± standard deviation) of macroinvertebrates per square meter in Goose Island Channel (site 6A), 1989.

	APRIL	JUNE	JULY	SEPTEMBER	-	MEAN	% ABUND
TRICHOPTERA							
Leptoceridae	692 ± 763			63 ± 109	63 ± 109	163.5	0.4
Hydroptilidae	5409 ± 8552		315 ± 393	189 ± 0	377 ± 327	1257.9	3.3
Polvcentropodidae				126 ± 218		25.2	0.1
Glossosomatidae		63 ± 109				12.6	< 0.1
EPHEMEROPTERA							
Tricorythidae	377 ± 327	252 ± 436	126 ± 218	10943 ± 5283	22453 ± 33283	6830.2	17.7
Baetidae	63 ± 109		252 ± 436	1258 ± 2018	440 ± 288	402.5	1.0
COLEOPTERA							
Elmidae larvae	63 ± 109			503 ± 576	315 ± 393	176.1	0.5
Elmidae adults	63 ± 109	63 ± 109				25.2	0.1
DIPTERA							
Chironomidae larvae	16981 ± 15151	1950 ± 663	4403 ± 7141	4528 ± 4762		5572.3	14.4
Chironomidae pupae	692 ± 663	63 ± 109	252 ± 436	63 ± 109	17233 ± 4530	3660.4	9.5
Ceratopogonidae	2264 ± 1051	881 ± 663	1761 ± 2397	315 ±218	315 ± 288	1106.9	2.9
Tipulidae	189 ± 327					37.7	0.1
Simuliidae					63 ± 109	12.6	< 0.1
Empididae					189 ± 189	37.7	0.1
ODONATA							
Coenagrioniidae	1069 ± 1256			440 ± 763	1258 ± 892	553.5	1.4
HYDRACARINA	2264 ± 1800	252 ± 288	1509 ± 2288	1950 ± 1783	1509 ± 1148	1496.9	3.9
AMPHIPODA							
Talitridae		189 ± 189	1258 ± 1039	17044 ± 26165	23082 ± 20648	8314.5	21.5
ANNELIDA							
Lumbriculidae	3522 ± 1441	755 ± 189	5409 ± 8390	11509 ± 7388	2704 ± 1549	4779.9	12.4
Hirudinea	63 ± 109				63 ± 109	25.2	0.1
PLATYHELMINTHES							
Planariidae	126 ± 109				189 ± 189	62.9	0.2
NEMATODA	2390 ± 2275	126 ± 218	377 ± 654	377 ± 377	126 ± 109	679.3	1.8
MOLLUSCA							
Planorbidae	5283 ± 3535	440 ± 607	1006 ± 950	2893 ± 3747	3145 ± 4304	2553.5	6.6
Lymnaeidae	755 ± 1307			126 ± 218	189 ± 327	213.8	0.6
Sphaeriidae	63 ± 109	126 ± 218	377 ± 499	189 ± 189	1824 ± 2839	515.7	1.3
TERRESTRIAL INSECTS			63 ± 109	440 ± 109	63 ± 109	113.2	0.3
TOTAL8	42,327	5157	17,107	52,956	75,598	38.629.1	

Table D.11. Mean number (± standard deviation) of invertebrates per square meter (collected by Hess sampler) in LeClerc Creek, WA, 1989.

	MARCH	JUNE	JULY	SEPTEMBER	OCTOBER	TOTAL	% ABUND
TRICHOPTERA							
Glossosomatidae	25 ± 24	30 ± 26	118 ± 85	133 ± 57	20 ± 28	65.0	1.5
Brachycentridae	538 ± 455	65 ± 62	85 ± 130	88 ± 93	148 ± 163	184.5	4.1
Hydropsychidae	78 ± 43		13 ± 19	113 ± 105	98 ± 90	60.0	1.3
Hydroptilidae				13 ± 25		2.5	0.1
Limnephilidae	23 ± 39	45 ± 77	25 ± 38	18 ± 22		22.0	0.5
Rhyacophilidae	145 ± 103	48 ± 37	160 ± 190	95 ± 84	65 ± 68	102.5	2.3
Lepidostomatidae			8 ± 15	5 ± 10		2.5	0.1
Psychomyiidae					20 ± 40	4.0	0.1
T. pupae	5 ± 6	5 ± 10	13 ± 15	28 ± 55		10.0	0.2
EPHEMEROPTERA							
Heptageniidae	573 ± 331	120 ± 52	290 ± 209	278 ± 314	323 ± 262	316.5	7.1
Ephemerellidae	1140 ± 864	95 ± 77	108 ± 87	45 ± 19	215 ± 181	320.5	7.2
Baetidae	1650 ± 1044	750 ± 420	2280 ± 1270	1000 ± 575	400 ± 321	1216.0	27.3
Leptophlebiidae	18 ± 35				8 ± 10	5.0	0.1
PLECOPTERA							
Chloroperlidae	230 ± 39	90 ± 41	160 ± 50	73 ± 53	45 ± 57	119.5	2.7
Perlidae	10 ± 14				5 ± 10	3.0	0.1
Nemouridae	10 ± 14		20 ± 40	40 ± 27	5 ± 10	15.0	0.3
Perlodidae			78 ± 155	38 ± 35	30 ± 9	29.0	0.7
Capniidae	3 ± 5					0.5	<0.1
COLEPTERA							
Elmidae larvae	178 ± 75	288 ± 107	138 ± 84	333 ± 162	138 ± 51	214.5	4.8
Elmidae adults	10 ± 14	3 ± 5	30 ± 12	20 ± 23	13 ± 10	15.0	0.3
ODONATA							
Coenagrioniidae	3 ± 5					0.5	<0.1
DIPTERA							
Chironomidae larvae	545 ± 266	1945 ± 1980	3548 ± 4884	953 ± 924	5 ± 6	1399.0	31.4
Chironomidae pupae	3 ± 5		88 ± 138	48 ± 26		27.5	0.6
Ceratopogonidae	3 ± 5	20 ± 18	13 ± 13	18 ± 29		10.5	0.2
Tipulidae	10 ± 14	10 ± 14	5 ± 10	5 ± 10	10 ± 20	8.0	0.2
Simuliidae	28 ± 38	40 ± 41	248 ± 147	45 ± 42	8 ± 15	73.5	1.7
Tabanidae	10 ± 14					2.0	<0.1
Empididae	5 ± 6		3 ± 5			1.5	<0.1
Psychodidae					3 ± 5	0.5	<0.1
Sciomyzidae				3 ± 5		0.5	<0.1
Dolichopodidae	3 ± 5					0.5	<0.1

Table D.11. (cont.)

	MARCH	JUNE	JULY	SEPTEMBER	OCTOBER	TOTAL	% ABUND
HYDRACARINA	8 ± 5	20 ± 27	13 ± 15	23 ± 19		12.5	0.3
ANNELIDA							
Lumbriculidae	195 ± 258		130 ± 38			65.0	1.5
Naididae	18 ± 35	465 ± 400	5 ± 10			97.5	2.2
Hirudinea							< 0.1
PLATYHELMINTHES							
Planariidae	123 ± 136	8 ± 10	15 ± 13			29.0	0.7
NEMATODA	8 ± 15	8 ± 10	5 ± 6			4.0	0.1
MOLLUSCA							
Planorbidae	10 ± 14			3 ± 5		2.5	0.1
Lymnaeidae							< 0.1
Sphaeriidae	3 ± 5					0.5	< 0.1
TERRESTRIALS							
COLLEMBOLA	5 ± 10		5 ± 6			2.0	< 0.1
DIPTERA							
Ceratopogonidae	8 ± 15					1.5	< 0.1
HOMOPTERA							
Aphididae		3 ± 5	5 ± 6	5 ± 10		2.5	0.1
Cicadellidae	3 ± 5					0.5	< 0.1
THYSANOPTERA							
Thripidae	10 ± 20	3 ± 5				2.5	0.1
ARACHNIDS			3 ± 5	3 ± 5		1.0	< 0.1
TOTALS	**5628**	**4058**	**7605**	**3418**	**1555**	**4452.5**	

Table D.12. Mean number (± standard deviation) of invertebrates per square meter (collected by Hess sampler) in Ruby Creek, WA, 1989.

	MARCH	APRIL	JUNE	JULY	SEPTEMBER	OCTOBER	TOTAL	% ABUND
TRICHOPTERA								
Glossosomatidae	35 ± 35	105 ± 78	58 ± 108	253 ± 397	3 ± 5	15 ± 30	54.6	3.1
Brachycentridae		5 ± 7	33 ± 38	5 ± 6	8 ± 10	8 ± 15	32.1	1.8
Hydropsychidae	200 ± 255		75 ± 100	20 ± 18	183 ± 182	40 ± 67	87.1	5.0
Limnephilidae	25 ± 21						4.2	0.2
Rhyacophilidae	40 ± 14	5 ± 7	8 ± 15	20 ± 22	8 ± 10	8 ± 15	14.6	1.0
Leptoceridae			8 ± 15				1.3	0.1
Psychomyiidae	5 ± 7					23 ± 45	4.6	0.3
EPHEMEROPTERA								
Heptageniidae	180 ± 42	40 ± 57	40 ± 61	73 ± 73	163 ± 62	80 ± 85	95.8	5.5
Ephemerellidae	105 ± 64	25 ± 21	25 ± 19	13 ± 10	208 ± 286	113 ± 114	81.3	4.7
Baetidae	200 ± 14	170 ± 226	115 ± 83	423 ± 598	225 ± 173	125 ± 149	209.6	12.1
Leptophlebiidae	10 ± 14				23 ± 33	33 ± 59	11.7	0.7
PLECOPTERA								
Chloroperlidae	45 ± 7	20 ± 28	33 ± 59	20 ± 34	3 ± 5	5 ± 6	20.8	1.2
Perlidae	30 ± 28	30 ± 42			10 ± 12	5 ± 10	12.5	0.7
Nemouridae	55 ± 50	135 ± 191	3 ± 5		15 ± 17		34.6	2.0
Perlodidae				23 ± 45	20 ± 18	23 ± 29	10.8	0.6
Capniidae					520 ± 616	8 ± 15	87.9	5.1
COLEPTERA								
Elmidae larvae	340 ± 396	135 ± 7	423 ± 461	230 ± 158	123 ± 103	88 ± 52	222.9	12.8
Elmidae adults	15 ± 21	5 ± 7	25 ± 17	65 ± 45	35 ± 34	3 ± 5	24.6	1.4
Georyssidae				30 ± 54			5	0.3
ODONATA								
Corduleastridae		5 ± 7					0.8	<0.1
DIPTERA								
Chironomidae larvae	335 ± 318	460 ± 157	940 ± 969	80 ± 141	153 ± 171		327.9	18.9
Chironomidae pupae	5 ± 7	15 ± 7	8 ± 10	20 ± 18			7.9	0.5
Ceratopogonidae	50 ± 28	85 ± 50	8 ± 15	3 ± 5	70 ± 121		35.8	2.1
Tipulidae	50 ± 57	30 ± 14	13 ± 25	13 ± 25		18 ± 29	20.4	1.2
Simuliidae	75 ± 21	160 ± 14	30 ± 30	30 ± 30	15 ± 17	83 ± 146	65.4	3.8
Empididae					3 ± 5		0.4	< 0.1
Psychodidae	15 ± 7	175 ± 78			35 ± 40	55 ± 90	46.7	2.7
Dixidae	10 + 14						1.7	0.1
HYDRACARINA	10 ± 0	5 ± 7	18 ± 13	13 ± 15	45 ± 53		15	0.9
ANNELIDA								
Lumbriculidae		180 ± 226					30	1.7

Table D.12. (cont.)

	MARCH	APRIL	JUNE	JULY	SEPTEMBER	OCTOBER	TOTAL	% ABUND
Naididae	390 ± 325		3 ± 5	20 ± 40			68.8	4.0
Hirudinea	5 ± 7						0.8	< 0.1
PLATYHELMINTHES								
Planariidae	40 ± 57						6.7	0.4
NEMATODA	5 ± 7						0.8	< 0.1
MOLLUSCA								
Planorbidae		5 ± 7		3 ± 5		3 ± 5	1.7	0.1
Sphaeriidae	5 ± 7	460 ± 212	3 ± 5				77.9	4.5
TERRESTRIALS								
COLLEMBOLA				3 ± 5			0.4	< 0.1
DIPTERA								
Chironomidae				5 ± 7			0.8	< 0.1
Simuliidae				5 ± 7			0.8	< 0.1
Empididae				3 ± 5			0.4	< 0.1
Mycetophilidae				3 ± 5			0.4	< 0.1
HOMOPTERA								
Aphididae				5 ± 7			0.8	< 0.1
Coccidae					3 ± 5		0.4	< 0.1
Cicadellidae			18 ± 29	3 ± 5			3.3	0.2
HYMENOPTERA								
Formicidae				13 ± 19			2.1	0.1
Eurytomidae				5 ± 7			0.8	< 0.1
Ichneumonidae				3 ± 5			0.4	< 0.1
Braconidae				3 ± 5			0.4	< 0.1
ARACHNIDS	5 ± 7			3 ± 5	3 ± 5		1.7	0.1
TOTALS	**2285**	**2260**	**1880**	**1403**	**1868**	**730**	**1737.5**	

Table D.13. Mean number (± standard deviation) of invertebrates per square meter (collected by Hess sampler) in Cee Cee Ah Creek, WA, 1989.

	MARCH	APRIL	JUNE	JULY	SEPTEMBER	OCTOBER	MEAN	% ABUND
TRICHOPTERA								
Glossosomatidae	65 ± 79	8 ± 5	55 ± 30	75 ± 88	5 ± 6	17 ± 21	37.4	1.1
Brachycentridae	185 ± 1041	15 ± 24	60 ± 69	70 ± 99	20 ± 34	10 ± 17	60.0	1.8
Hydropsychidae	25 ± 119		5 ± 6	8 ± 10	75 ± 88	80 ± 72	32.1	1.0
Hydroptilidae	23 ± 156						3.8	0.1
Limnephilidae	5 ± 9		70 ± 127		3 ± 5		12.9	0.4
Rhyacophilidae	65 ± 81	15 ± 13	63 ±39	85 ± 82	3 ± 5	33 ± 49	43.9	1.3
Philopotamidae					3 ± 5		0.4	< 0.1
Psychomyiidae						17 ± 29	2.8	0.1
T. pupae	5 ± 9		43 ± 61	13 ± 25			10.0	0.3
EPHEMEROPTERA								
Heptageniidae	253 ± 527	60 ± 55	295 ± 309	198 ± 208	100 ± 116	543 ± 424	241.4	7.2
Ephemerellidae	133 ± 266	15 ± 24	228 ± 102	53 ± 75	38 ± 25	33 ± 23	83.1	2.5
Baetidae	450 ± 1554	10 ± 8	470 ± 504	2188 ± 2080	223 ± 78	193 ± 153	588.9	17.6
Leptophlebiidae	38 ± 44			50 ± 58	20 ± 25	3 ± 6	18.5	0.6
Tricorythidae				23 ± 39			3.8	0.1
PLECOPTERA								
Chloroperlidae	173 ± 169	20 ± 22	213 ± 190	198 ± 156		70 ± 96	112.1	3.4
Perlidae	98 ± 678	10 ± 20	3 ± 5		20 ± 18	50 ± 50	30.0	0.9
Nemouridae	38 ± 48	20 ± 14	103 ± 44	23 ± 33		20 ± 27	33.8	1.0
Perlodidae	90 ± 127			53 ± 36	28 ± 43	67 ± 61	39.5	1.2
Peltoperlidae	38 ± 53	5 ± 10	538 ± 621	108 ± 135	3 ± 5	97 ± 167	131.1	3.9
Leuctridae					13 ± 19		2.1	0.1
COLEPTERA								
Elmidae larvae	463 ± 1350	95 ± 100	838 ± 475	455 ± 365	385 ± 324	123 ± 78	393.1	11.8
Elmidae adults	3 ± 5		18 ± 17	20 ± 16	20 ± 40	3 ± 6	10.6	0.3
Hydrophilidae		3 ± 5					0.4	< 0.1
Dytiscidae					3 ± 5		0.4	< 0.1
Georyssidae					8 ± 15		1.3	< 0.1
DIPTERA								
Chironomidae larvae	3850 ± 5113	400 ± 580	1098 ± 436	548 ± 639	85 ± 79	97 ± 167	1012.8	30.3
Chironomidae pupae	15 ± 35			15 ± 6	3 ± 5		5.4	0.2
Ceratopogonidae	30 ± 100	3 ± 5	10 ± 8		3 ± 5		7.5	0.2
Tipulidae	20 ± 120	8 ± 10	25 ± 31	8 ± 10			10.0	0.3
Simuliidae	23 ± 64	5 ± 6	65 ± 52	35 ± 13	8 ± 10	3 ± 6	23.1	0.7
Empididae	10 ± 19	3 ± 5	13 ± 13				4.2	0.1
Psychodidae	3 ± 18		3 ± 5	3 ± 5	5 ± 10	7 ± 6	3.2	0.1

Table D.13. (cont.)

	MARCH	APRIL	JUNE	JULY	SEPT.	OCTOBER	MEAN	% ABUND
Pelecorhynchidae	3 ± 5						0.4	< 0.1
Anthericidae						3 ± 6	0.6	< 0.1
NON INSECTS								
HYDRACARINA	13 ± 22		130 ± 115	48 ± 39	10 ± 14		33.3	1.[illegible]
ANNELIDA								
Lumbriculidae	423 ± 2555	23 ± 10	28 ± 34	95 ± 114		40 ± 69	99.6	3.0
Naididae	238 ± 1331		25 ± 33				43.8	1.3
Hirudinea	293 ± 1950	3 ± 5					49.2	1.5
PLATYHELMINTHES								
Planariidae			103 ± 109	18 ± 21			20.0	0.6
NEMATODA	8 ± 52	20 ± 28	83 ± 109	15 ± 17			20.8	0.6
MOLLUSCA								
Planorbidae	3 ± 18	3 ± 5					0.8	< 0.1
Lymnaeidae	3 ± 18						0.4	< 0.1
Sphaeriidae	350 ± 2052	13 ± 19	173 ± 163	8 ± 15	83 ± 138		104.2	3.1
TERRESTRIAL INSECTS								
COLLEMBOLA		5 ± 6					0.8	< 0.1
TRICHOPTERA		8 ± 10					1.3	< 0.1
EPHEMEROPTERA								
Ephemerelidae				3 ± 5			0.4	< 0.1
COLEOPTERA								
HOMOPTERA								
Aphididae			13 ± 10				2.1	0.1
Cicadellidae						3 ± 6	0.6	< 0.1
HYMENOPTERA								
Formicidae					3 ± 5		0.4	< 0.1
THYSANOPTERA								
Thripidae			10 ± 8				1.7	< 0.1
ARACHNIDS		3 ± 5	5 ± 10	3 ± 5			1.7	< 0.1
OTHERS		5 ± 6		8 ± 15			2.1	0.1
TOTALS	7425	773	4778	4408	1163	1513	3343.0	

Table D.14. Mean number (± standard deviation) of invertebrates per square meter (collected by Hess sampler) in Tacoma Creek, WA, 1989.

	MARCH	JUNE	JULY*	SEPTEMBER	OCTOBER	MEAN	% ABUND
TRICHOPTERA							
Glossosomatidae		435 ± 290	10		110 ± 14	111.0	3.1
Brachycentridae	650 ± 113	5 ± 7	10	195 ± 106	630 ± 14	298.0	8.3
Hydropsychidae	50 ± 42				180 ± 28	46.0	1.3
Limnephilidae				5 ± 7	20 ± 14	5.0	0.1
Rhyacophilidae	15 ± 21	65 ± 64		5 ± 7	155 ± 7	48.0	1.3
Leptoceridae				5 ± 7		1.0	< 0.1
T. pupae		30 ± 28				6.0	0.2
EPHEMEROPTERA							
Heptageniidae	115 ± 35	180 ± 198	30		1050 ± 127	275.0	7.6
Ephemerellidae	185 ± 191	340 ± 156	10	40 ± 14	545 ± 163	224.0	6.2
Baetidae	535 ± 262	175 ± 21	70	40 ± 14	3125 ± 7	789.0	21.9
Leptophlebiidae	35 ± 50			40 ± 14	10 ± 0	17.0	0.5
PLECOPTERA							
Chloroperlidae		35 ± 35			190 ± 141	45.0	1.2
Perlidae		5 ± 7			30 ± 0	7.0	0.2
Nemouridae	20 ± 28	65 ± 78	40		315 ± 50	88.0	2.4
Perlodidae			50	25 ± 21		15.0	0.4
Peltoperlidae		5 ± 7				1.0	< 0.1
Leuctridae	20 ± 28					4.0	0.1
Capniidae					90 ± 28	18.0	0.5
COLEPTERA							
Elmidae larvae	605 ± 205	600 ± 382	500	570 ± 734	2235 ± 92	902.0	25.0
Elmidae adults	20 ± 14	135 ± 21		50 ± 57	100 ± 0	61.0	1.7
LEPIDOPTERA							
Pyralidae	125 ± 35					25.0	0.7
DIPTERA							
Chironomidae larvae	590 ± 212	375 ± 134	200	10 ± 0	150 ± 0	265.0	7.3
Chironomidae pupae			20			4.0	0.1
Ceratopogonidae		30 ± 14		5 ± 7	10 ± 14	9.0	0.2
Tipulidae	25 ± 21	25 ± 7	50		95 ± 21	39.0	1.1
Simuliidae	70 ± 14	165 ± 64			345 ± 35	116.0	3.2
Empididae		5 ± 7			5 ± 7	2.0	0.1
Psychodidae				15 ± 7	190 ± 85	41.0	1.1
HYDRACARINA	160 ± 85	90 ± 99	10	5 ± 7	35 ± 7	60.0	1.7
ANNELIDA							
Lumbriculidae	195 ± 134	5 ± 7			30 ± 28	46.0	1.3

Table D.14. (cont.)

	MARCH	JUNE	JULY*	SEPTEMBER	OCTOBER	MEAN	% ABUND
PLATYHELMINTHES							
Planariidae	80 ± 113				20 ± 14	20.0	0.6
NEMATODA	10 ± 14	5 ± 7				3.0	0.1
MOLLUSCA							
Sphaeriidae	5 ± 7	10 ± 14		10 ± 14	5 ± 7	6.0	0.2
TERRESTRIALS							
COLLEMBOLA	5 ± 7					1.0	< 0.1
DIPTERA							
Chironomidae	5 ± 7					1.0	< 0.1
Mycetophilidae					5 ± 7	1.0	< 0.1
HOMOPTERA							
Aphididae		10 ± 14		5 ± 7		3.0	0.1
Cicadellidae		5 ± 7				1.0	< 0.1
THYSANOPTERA							
Thripidae					15 ± 7	3.0	0.1
OTHERS	5 ± 7					1.0	< 0.1
TOTALS	3525	2800	1000	1025	9690	3608.0	

*Only 1 Hess sample was collected in July.

Table D.15. Mean number (± standard deviation) of invertebrates per square meter (collected by Hess sampler) in Skookum Creek, WA, 1989.

	MARCH	APRIL	JUNE	JULY	SEPTEMBER	OCTOBER	MEAN	% ABUND
TRICHOPTERA								
Glossosomatidae	15 ± 19	378 ± 186	110 ± 116	30 ± 29	33 ± 19	25 ± 24	98.3	2.1
Brachycentridae	43 ± 79	395 ± 585	10 ± 14	63 ± 67	80 ± 75	75 ± 90	110.8	2.4
Hydropsychidae		75 ± 56	103 ± 179	5 ± 6	5 ± 6	18 ± 17	34.2	0.7
Hydroptilidae	10 ± 20				18 ± 21		4.6	0.1
Limnephilidae	7 ± 15	18 ± 35	3 ± 5		10 ± 20		6.3	0.1
Rhyacophilidae	68 ± 55	308 ± 205	53 ± 47	88 ± 81	208 ± 145	75 ± 79	132.9	2.9
Leptoceridae		3 ± 5					0.4	< 0.1
Psychomyiidae					5 ± 10	18 ± 29	3.8	0.1
T. pupae			10 ± 14				1.7	< 0.1
EPHEMEROPTERA								
Heptageniidae	545 ± 452	853 ± 305	283 ± 235	58 ± 59	33 ± 33	1773 ± 2280	590.4	12.7
Ephemerellidae	943 ± 971	353 ± 178	265 ± 286	13 ± 13	560 ± 731	173 ± 325	384.2	8.2
Baetidae	988 ± 766	700 ± 498	1220 ± 1801	160 ± 37	570 ± 449	520 ± 441	692.9	14.9
Leptophlebiidae		18 ± 24	3 ± 5		95 ± 132	278 ± 388	65.4	1.4
PLECOPTERA								
Chloroperlidae	273 ± 111	1613 ± 2605	173 ± 83	103 ± 117	150 ± 201	110 ± 76	403.3	8.7
Perlidae		8 ± 10			10 ± 14	10 ± 14	4.6	0.1
Nemouridae	50 ± 52	30 ± 48	233 ± 360	15 ± 13	183 ± 259	15 ± 19	87.5	1.9
Perlodidae	205 ± 253	15 ± 30		20 ± 25	3 ± 5	188 ± 133	71.7	1.5
Peltoperlidae			5 ± 10				2.9	0.1
Capniidae		68 ± 67		13 ± 15	20 ± 34		14.6	0.3
Pteronarcyidae						3 ± 5	0.4	< 0.1
COLEPTERA								
Elmidae larvae	233 ± 148	330 ± 149	885 ± 1060	235 ± 254	378 ± 334	1250 ± 1220	551.7	11.8
Elmidae adults	15 ± 13	3 ± 5	298 ± 530	10 ± 14	5 ± 6	68 ± 90	66.3	1.4
DIPTERA								
Chironomidae larvae	1005 ± 852	693 ± 591	403 ± 208	65 ± 33	1150 ± 1288	100 ± 59	569.2	12.2
Chironomidae pupae	10 ± 12	35 ± 31	3 ± 5			3 ± 5	8.3	0.2
Ceratopogonidae	48 ± 32	38 ± 38	20 ± 34	15 ± 30	35 ± 47	8 ± 15	27.1	0.6
Tipulidae	35 ± 38	93 ± 75	3 ± 5	27 ± 34	275 ± 444	13 ± 15	74.2	1.6
Simuliidae	130 ± 207	73 ± 85	25 ± 13	8 ± 10	5 ± 10	143 ± 233	63.8	1.4
Empididae	8 ± 10	35 ± 64	3 ± 5		5 ± 10	3 ±5	8.8	0.2
Psychodidae	70 ± 95		3 ± 5			48 ± 56	20.0	0.4
HYDRACARINA	15 ± 24	25 ± 24	53 ± 48	5 ± 6	38 ± 45	15 ± 19	25.0	0.5
ANNELIDA								
Lumbriculidae	175 ± 124	298 ± 250	140 ± 121		60 ± 80	956 ± 1908	271.7	5.8

Table D.15. (cont.)

	MARCH	APRIL	JUNE	JULY	SEPTEMBER	OCTOBER	MEAN	% ABUND
Naididae	33 ± 40						5.4	0.1
PLATYHELMINTHES								
Planariidae	45 ± 53	363 ± 176	15 ± 17		5 ± 6		71.3	1.5
NEMATODA	258 ± 309	30 ± 22	58 ± 115	3 ± 5			57.9	1.2
MOLLUSCA								
Planorbidae	18 ± 21	10 ± 20	3 ± 5		53 ± 61		13.8	0.3
Sphaeriidae	195 ± 208	88 ± 148	15 ± 13		273 ± 457	40 ± 80	101.7	2.2
TERRESTRIALS								
COLLEMBOLA	3 ± 5					3 ± 5	0.8	< 0.1
TRICHOPTERA		20 ± 8					3.3	0.1
DIPTERA								
Simuliidae		3 ± 5	5 ± 6				1.3	< 0.1
PLECOPTERA								
Chloroperlidae			3 ± 5				0.4	< 0.1
HOMOPTERA								
Aphididae			3 ± 5		8 ± 15		1.7	< 0.1
Cicadellidae		8 ± 10					1.3	< 0.1
HYMENOPTERA								
Formicidae			3 ± 5				0.4	< 0.1
HYMENOPTERA								
THYSANOPTERA								
Thripidae		3 ± 5	3 ± 5				0.8	< 0.1
ARACHNIDA						3 ± 5	0.4	< 0.1
OTHERS				3 ± 5			0.4	< 0.1
TOTALS	5438	6973	4405	935	4268	5928	4657.5	

Table D.16. Mean number (± standard deviation) of macroinvertebrates per 100 cubic meters (collected by drift sample) in LeClerc Creek, WA, 1989.

	MARCH	JUNE	JULY	SEPTEMBER	OCTOBER	MEAN	% ABUND
TRICHOPTERA							
Glossosomatidae		0.2 ± 0.4	1.6 ± 1.9	0.7 ± 1.4	0.5 ± 0.6	0.6	0.5
Brachycentridae	8.2 ± 9.8	6.0 ± 6.5	2.8 ± 2.1	4.1 ± 3.8	3.1 ± 5.2	4.8	3.9
Hydropsychidae		0.2 ± 0.4	0.2 ± 0.5	0.3 ± 0.7		0.1	0.1
Limnephilidae			0.1 ± 0.2			< 0.1	< 0.1
Rhyacophilidae	1.4 ± 2.1	1.1 ± 1.4	1.2 ± 1.2	1.1 ± 1.2	0.8 ± 1.1	1.1	0.9
Polycentropodidae		0.3 ± 0.7				0.1	< 0.1
T. pupae			0.2 ± 0.5			< 0.1	< 0.1
EPHEMEROPTERA							
Heptageniidae	1.5 ± 2.1	1.2 ± 1.4	0.6 ± 0.8	0.5 ± 1.0	2.2 ± 2.7	1.2	1.0
Ephemerellidae	12.9 ± 21.6	11.6 ± 17.5	0.2 ± 0.5	1.0 ± 1.3	1.2 ± 1.0	5.4	4.3
Baetidae	25.0 ± 29.1	42.0 ± 42.2	26.7 ± 16.8	42.1 ± 70.0	12.9 ± 7.7	29.7	23.7
Leptophlebiidae			0.7 ± 1.4		0.3 ± 0.5	0.2	0.2
PLECOPTERA							
Chloroperlidae		7.9 ± 10.5	0.4 ± 0.5	0.2 ± 0.3	3.6 ± 3.8	2.4	1.9
Perlidae				0.6 ± 0.7		0.1	0.1
Nemouridae	0.3 ± 0.7		1.9 ± 3.7	0.2 ± 0.3	2.4 ± 2.1	1.0	0.8
Perlodidae		0.4 ± 0.5	0.5 ± 0.9	0.3 ± 0.5	0.2 ± 0.5	0.3	0.2
COLEPTERA							
Elmidae larvae	2.1 ± 1.6	28.6 ± 30.5	3.4 ± 2.4	4.8 ± 3.6	5.4 ± 4.7	8.9	7.1
Elmidae adults	0.6 ± 1.2	2.6 ± 1.9	2.5 ± 2.3	7.5 ± 13.1	0.2 ± 0.4	2.7	2.1
Dytiscidae		0.5 ± 0.9		0.7 ± 1.4		0.2	0.2
Georyssidae		0.3 ± 0.7	0.1 ± 0.2	2.7 ± 5.4		0.6	0.5
DIPTERA							
Chironomidae larvae	13.4 ± 18.5	55.8 ± 104.7	15.0 ± 10.6	10.5 ± 13.4	3.7 ± 3.8	19.7	15.7
Chironomidae pupae	22.5 ± 42.3	14.7 ± 25.7	8.0 ± 13.2	39.5 ± 47.5	0.2 ± 0.5	17.0	13.5
Ceratopogonidae		0.3 ± 0.6				0.1	< 0.1
Tipulidae		0.9 ± 1.3	0.2 ± 0.5	1.6 ± 2.6	0.2 ± 0.5	0.6	0.5
Simuliidae	1.1 ± 2.3	17.6 ± 25.8	6.2 ± 6.5	22.4 ± 43.1	0.5 ± 1.0	9.6	7.6
Psychodidae		0.7 ± 1.3				0.1	0.1
Stratiomyidae	0.4 ± 0.8					0.1	0.1
Mycetophilidae					0.5 ± 1.0	0.1	0.1
Dixidae	0.4 ± 0.8		0.2 ± 0.5			0.1	0.1
HYDRACARINA	0.3 ± 0.7	4.3 ± 8.6	2.0 ± 1.7	4.8 ± 7.7	0.9 ± 1.9	2.5	2.0
ANNELIDA							
Lumbriculidae	1.1 ± 2.3	0.7 ± 1.3	1.1 ± 1.9	0.2 ± 0.3	0.3 ± 0.5	0.7	0.5
Hirudinea	1.1 ± 2.3					0.2	0.2
PLATYHELMINTHES							
Planariidae		0.1 ± 0.2				< 0.1	< 0.1
MOLLUSCA							
Planorbidae			0.2 ± 0.5			< 0.1	< 0.1

Table D.16. (cont.)

	MARCH	JUNE	JULY	SEPTEMBER	OCTOBER	MEAN	% ABUND
Lymnaeidae		0.3 ± 0.7				0.1	< 0.1
Sphaeriidae		0.3 ± 0.7				0.1	< 0.1
TERRESTRIAL INSECTS							
COLLEMBOLA				1.7 ± 2.6		0.3	0.3
DIPTERA							
Chironomidae	1.5 ± 2.2	0.5 ± 0.9	0.3 ± 0.6	0.7 ± 1.4		0.6	0.5
Simuliidae	0.6 ± 1.2		0.3 ± 0.4	6.7 ± 11.9		1.5	1.2
Empididae	4.5 ± 9.0					0.9	0.7
Mycetophilidae	1.1 ± 2.3	0.5 ± 0.9	1.3 ± 1.9		0.9 ± 1.9	0.8	0.6
Sciaridae				0.3 ± 0.5		0.1	< 0.1
TRICHOPTERA	1.1 ± 2.3	1.0 ± 0.8	0.5 ± 0.9	1.1 ± 2.2		0.7	0.6
EPHEMEROPTERA							
Baetidae		0.2 ± 0.5	1.3 ± 1.8	14.5 ± 26.7		3.2	2.5
Ephemerelidae		0.2 ± 0.5				< 0.1	< 0.1
PLECOPTERA			0.1 ± 0.2			< 0.1	< 0.1
COLEOPTERA							
Staphylinidae				0.7 ± 1.4		0.1	0.1
Curculionidae		0.3 ± 0.7				0.1	< 0.1
Hydrophilidae		0.3 ± 0.7				0.1	< 0.1
Dytiscidae		0.3 ± 0.7	0.4 ± 0.5			0.1	0.1
Chrysomelidae		0.3 ± 0.7				0.1	< 0.1
Dermestidae		0.3 ± 0.7				0.1	< 0.1
Carabidae	1.1 ± 2.3					0.2	0.2
HEMIPTERA							
Lygaeidae		0.3 ± 0.7				0.1	< 0.1
HOMOPTERA							
Aphididae		4.9 ± 5.1	2.0 ± 1.6	9.0 ± 15.8		3.2	2.5
Cicadellidae		1.0 ± 2.0	0.2 ± 0.5			0.2	0.2
HYMENOPTERA							
Formicidae		1.7 ± 2.0	0.6 ± 0.5	1.0 ± 1.3		0.7	0.5
Eurytomidae				0.7 ± 1.4		0.1	0.1
Ichneumonidae			0.2 ± 0.5		0.5 ± 1.0	0.1	0.1
Pteromalidae				0.7 ± 1.4		0.1	0.1
PSOCOPTERA							
Psocidae				2.4 ± 3.9		0.5	0.4
NEUROPTERA							
Chrysopidae				0.7 ± 1.4		0.1	0.1
ARACHNIDS		0.7 ± 1.3	0.3 ± 0.4	0.9 ± 1.3		0.4	0.3
OTHERS				3.4 ± 6.8		0.7	0.5
TOTALS	**102**	**211**	**84**	**190**	**41**	**125.6**	

Table D.17. Mean number (± standard deviation) of benthic macroinvertebrates per 100 cubic meters (collected by drift sample) in Ruby Creek, WA, 1989.

	MARCH	APRIL	JUNE	JULY	SEPTEMBER	OCTOBER	MEAN	% ABUND
TRICHOPTERA								
Glossosomatidae				2.5 ± 3.5	1.9 ± 2.3		0.7	0.2
Brachycentridae	46.7 ± 39.9	1.3 ± 2.6	15.9 ± 31.3	6.7 ± 13.0	0.6 ± 1.2		11.9	2.8
Hydropsychidae	2.9 ± 3.3	0.9 ± 1.8	1.1 ± 2.3	48.5 ± 50.8	3.6 ± 5.0		5.7	1.3
Hydroptilidae		0.2 ± 0.4						
Limnephilidae	91.9 ± 55.7	0.9 ± 1.8	0.2 ± 0.5				15.5	3.7
Rhyacophilidae	19.9 ± 14.6	0.2 ± 0.4	0.9 ± 1.8	8.5 ± 8.1	3.5 ± 4.9	0.3 ± 0.5	4.9	1.2
Lepidostomatidae					1.3 ± 2.6		0.2	0.1
EPHEMEROPTERA								
Heptageniidae	63.0 ± 58.4	1.3 ± 2.6	0.7 ± 0.9	42.0 ± 45.0	2.4 ± 3.3	0.3 ± 0.5	15.1	3.6
Ephemerellidae	47.8 ± 27.9	2.1 ± 3.3	2.3 ± 4.0	3.7 ± 2.7	5.6 ± 6.9	5.4 ± 10.9	11.3	2.7
Baetidae	296.6 ± 257.7	0.2 ± 0.4	6.8 ± 9.5	285.7 ± 189.1	67.4 ± 56.1	4.1 ± 5.7	96.9	23.0
Leptophlebiidae	19.9 ± 14.6				1.0 ± 2.0	2.1 ± 4.1	4.1	1.0
PLECOPTERA								
Chloroperlidae		0.6 ± 1.2		11.6 ± 13.3	2.6 ± 2.1		1.7	0.4
Perlidae				1.9 ± 2.2	0.3 ± 0.6		0.2	0.1
Nemouridae	656.8 ± 497.2	59.9 ± 104.8	1.1 ± 2.3	16.6 ± 12.6	3.6 ± 6.5		121.9	29.0
Perlodidae	5.4 ± 6.3			2.1 ± 2.0	3.0 ± 5.1		1.8	0.4
Capniidae		0.4 ± 0.9					0.1	< 0.1
COLEPTERA								
Elmidae larvae	8.7 ± 10.0	5.3 ± 4.4	20.2 ± 34.7	83.2 ± 73.1	23.2 ± 19.2	7.6 ± 7.4	18.8	4.5
Elmidae adults	10.9 ± 12.6	1.3 ± 2.6	8.5 ± 15.6	21.4 ± 20.0	3.1 ± 3.6		6.1	1.4
Dytiscidae			0.7 ± 1.4	0.2 ± 0.5			0.2	< 0.1
Staphylinidae		0.2 ± 0.4		2.1 ± 4.2			0.4	0.1
Georyssidae			0.7 ± 1.4		0.3 ± 0.7		0.2	< 0.1
DIPTERA								
Chironomidae larvae	78.5 ± 45.4	35.5 ± 30.5	13.9 ± 17.5	9.5 ± 3.1	9.2 ± 8.6		24.0	5.7
Chironomidae pupae	8.3 ± 5.4		7.2 ± 13.4		5.4 ± 6.9		3.5	0.8
Ceratopogonidae		2.6 ± 4.2		5.8 ± 6.7			0.9	0.2
Tipulidae	11.2 ± 6.5	3.4 ± 3.1	0.2 ± 0.5	0.4 ± 0.9			2.6	0.6
Simuliidae	147.4 ± 150.7	18.7 ± 29.7	9.5 ± 15.6	35.3 ± 64.1	16.3 ± 18.3	3.7 ± 4.3	38.5	9.2
Psychodidae	8.3 ± 5.4	7.7 ± 12.6	0.2 ± 0.5	6.0 ± 6.5		2.7 ± 5.4	3.7	0.9
Dixidae		0.2 ± 0.4					< 0.1	< 0.1
HYDRACARINA	13.8 ± 11.3	2.6 ± 1.9	7.2 ± 14.0	12.7 ± 12.0	4.1 ± 4.1	2.7 ± 5.4	6.2	1.5
ANNELIDA								
Lumbriculidae	11.2 ± 6.5			42.4 ± 48.9			5.4	1.3
Naididae		16.4 ± 16.0					2.7	0.7
PLATYHELMINTHES								
Planariidae	14.5 ± 16.7						2.4	0.6
NEMATODA		2.1 ± 1.0					0.4	0.1
MOLLUSCA								

Table D.17. (cont.)

	MARCH	APRIL	JUNE	JULY	SEPTEMBER	OCTOBER	MEAN	% ABUND
Planorbidae		1.0 ± 1.2					0.2	< 0.1
Sphaeriidae	14.5 ± 16.7	12.0 ± 10.6			0.3 ± 0.6		4.5	1.1
TERRESTRIAL INSECTS								
COLLEMBOLA	5.4 ± 6.3	1.4 ± 1.0	1.7 ± 3.1	3.3 ± 2.0	3.0 ± 3.5		2.3	0.5
DIPTERA								
Chironomidae			2.5 ± 5.0	2.1 ± 4.2			0.8	0.2
Simuliidae			0.2 ± 0.5	0.4 ± 0.4	0.9 ± 1.8		0.3	0.1
Empididae			0.8 ± 1.0	0.4 ± 0.9			0.2	< 0.1
Tipulidae			0.5 ± 0.9				0.1	< 0.1
Sciaridae			0.5 ± 0.9	0.6 ± 1.4			0.2	< 0.1
Scatopsidae			0.1 ± 0.3				< 0.1	< 0.1
TRICHOPTERA			0.2 ± 0.5				< 0.1	< 0.1
EPHEMEROPTERA								
Baetidae				0.4 ± 0.4	3.9 ± 7.9		0.7	0.2
Ephemerelidae			0.2 ± 0.5				< 0.1	< 0.1
PLECOPTERA				1.0 ± 1.2			0.2	< 0.1
COLEOPTERA								
Tenebrionidae			0.2 ± 0.5				< 0.1	< 0.1
Staphylinidae		0.4 ± 0.8					0.1	< 0.1
Curculionidae			0.2 ± 0.5				< 0.1	< 0.1
Salpingidae				0.2 ± 0.4			< 0.1	< 0.1
HEMIPTERA								
Saldidae			0.2 ± 0.5				< 0.1	< 0.1
HOMOPTERA								
Aphididae			4.7 ± 7.8	1.5 ± 2.4			1.0	0.2
Cicadellidae		1.0 ± 1.0	0.2 ± 0.5	0.2 ± 0.4			0.2	0.1
HYMENOPTERA								
Formicidae		0.4 ± 0.9	0.7 ± 0.9	0.8 ± 0.9	0.3 ± 0.6		0.4	0.1
Scelionidae				0.2 ± 0.5			< 0.1	< 0.1
Ceraphonidae				0.2 ± 0.5			< 0.1	< 0.1
Ichneumonidae			0.5 ± 0.9				0.1	< 0.1
Mymaridae			0.9 ± 1.8				0.2	< 0.1
Braconidae				0.2 ± 0.5			< 0.1	< 0.1
NEUROPTERA								
Chrysopidae		0.4 ± 0.9					0.1	< 0.1
Coniopterygidae			0.2 ± 0.5				< 0.1	< 0.1
ARACHNIDS		1.8 ± 3.5		0.4 ± 0.4	0.3 ± 0.6		0.4	0.1
OTHERS	2.9 ± 3.3	0.7 ± 0.8					0.6	0.1
TOTALS	1587	183	112	445	167	29	420.4	

Table D.18. Mean number (± standard deviation) of benthic macroinvertebrates per 100 cubic meters (collected by drift sample) in Cee Cee Ah Creek, WA, 1989.

	MARCH	APRIL	JUNE	JULY	SEPTEMBER	OCTOBER	MEAN	% ABUND
TRICHOPTERA								
Glossosomatidae	1.2 ± 1.6	0.5 ± 1.0				0.4 ± 0.7	0.4	0.3
Brachycentridae	2.6 ± 2.3	1.0 ± 2.1		0.3 ± 0.6			0.7	0.6
Hydropsychidae					0.5 ± 1.0	0.1 ± 0.3	0.1	0.1
Hydroptilidae						1.0 ± 2.0	0.2	0.2
Limnephilidae		0.5 ± 1.0		0.3 ± 0.6		1.0 ± 2.0	0.3	0.3
Rhyacophilidae		3.2 ± 6.4		0.3 ± 0.6		1.7 ± 2.1	0.9	0.8
Philopotamidae		0.5 ± 1.0					0.1	0.1
EPHEMEROPTERA								
Heptageniidae	6.8 ± 8.4	10.4 ± 11.2	1.0 ± 2.0	0.8 ± 1.1	0.5 ± 1.0	2.7 ± 2.0	3.7	3.6
Ephemerellidae	1.5 ± 2.6			0.9 ± 0.6	0.5 ± 1.0	3.1 ± 6.1	1.0	1.0
Baetidae	12.1 ± 5.9	12.5 ± 9.9	2.9 ± 3.5	8.4 ± 5.8	6.2 ± 2.1	15.6 ± 21.2	9.6	9.3
Leptophlebiidae	0.9 ± 1.4			1.0 ± 2.1	0.5 ± 1.0	0.4 ± 0.7	0.5	0.5
PLECOPTERA								
Chloroperlidae					0.5 ± 1.0	1.1 ± 2.2	0.3	0.3
Nemouridae	2.3 ± 1.8	1.4 ± 2.0		0.2 ± 0.3	1.3 ± 1.9	1.1 ± 2.2	1.1	1.0
Perlodidae						0.4 ± 0.4	0.1	0.1
Peltoperlidae	0.3 ± 0.7			0.3 ± 0.6			0.1	0.1
COLEPTERA								
Elmidae larvae	1.6 ± 2.1	20.1 ± 29.4	1.4 ± 1.9	2.6 ± 3.1	9.4 ± 9.6	1.6 ± 1.8	6.1	5.9
Elmidae adults	0.3 ± 0.7			0.5 ± 0.6	0.9 ± 1.1	1.2 ± 1.9	0.5	0.5
Chrysomelidae	0.2 ± 0.3						< 0.1	< 0.1
Hydrophilidae		3.2 ± 6.4					0.5	0.5
Georyssidae			0.2 ± 0.3	0.3 ± 0.6	0.7 ± 1.3		0.2	0.2
ODONATA								
Coenagrioniidae		3.2 ± 6.4					0.5	0.5
DIPTERA								
Chironomidae larvae	8.7 ± 8.1	62.7 ± 56.6	4.4 ± 7.9	5.0 ± 4.6	2.0 ± 2.3	17.6 ± 20.4	16.7	16.2
Chironomidae pupae	0.7 ± 0.8	9.5 ± 12.2	8.5 ± 16.1	4.9 ± 4.0	1.0 ± 2.0	0.1 ± 0.3	4.1	4.0
Ceratopogonidae		6.7 ± 12.5				2.0 ± 4.1	1.5	1.4
Tipulidae	0.7 ± 1.5	7.8 ± 5.8					1.4	1.4
Simuliidae	2.6 ± 3.0	6.4 ± 7.3	1.4 ± 1.9	2.6 ± 2.0	3.0 ± 3.4	3.2 ± 4.1	3.2	3.1
Psychodidae	0.3 ± 0.5	9.5 ± 12.2					1.6	1.6
Stratiomyidae		7.1 ± 12.3					1.2	1.1
Dixidae	0.2 ± 0.3				0.3 ± 0.7		0.1	0.1
HYDRACARINA	0.2 ± 0.3	13.4 ± 5.6	3.8 ± 5.8	0.6 ± 1.2	1.1 ± 2.2	6.9 ± 9.6	4.3	4.2
ANNELIDA								

91

Table D.18. (cont.)

	-	APRIL	JUNE	JULY	SEPTEMBER	OCTOBER	MEAN	% ABUND
Lumbriculidae	*0.5 ± 0.7*	6.4 ± 12.7					1.2	1.1
Naididae		23.8 ± 24.6					4.0	3.8
PLATYHELMINTHES								
Planariidae	0.7 ± 0.8	3.2 ± 6.4					0.7	0.6
NEMATODA		66.1 ± 79.1	1.0 ± 2.0				11.2	10.9
MOLLUSCA								
Planorbidae		11.4 ± 18.0					1.9	1.8
Lymnaeidae	0.2 ± 0.3						< 0.1	< 0.1
Sphaeriidae	6.6 ± 8.4	48.0 ± 48.8			1.5 ± 3.1	7.5 ± 14.1	10.6	10.3
TERRESTRIAL INSECTS								
COLLEMBOLA	2.2 ± 2.5	23.9 ± 17.7				1.8 ± 3.6	4.7	4.5
DIPTERA								
Chironomidae	0.9 ± 1.3		0.4 ± 0.7		0.3 ± 0.7		0.3	0.3
Simuliidae				0.3 ± 0.6			0.1	< 0.1
Empididae	0.4 ± 0.8						0.1	0.1
Sciaridae				0.3 ± 0.6			0.1	< 0.1
Phoridae				0.3 ± 0.6			0.1	< 0.1
HOMOPTERA								
Aphididae		7.4 ± 6.4	0.1 ± 0.2	0.3 ± 0.6	0.3 ± 0.7	1.0 ± 2.0	1.5	1.5
Coccidae			0.1 ± 0.2				< 0.1	< 0.1
Cicadellidae						0.1 ± 0.3	< 0.1	< 0.1
HYMENOPTERA								
Formicidae					0.7 ± 1.3		0.1	0.1
Cimbicidae			0.4 ± 0.7				0.1	0.1
Pteromalidae					0.5 ± 1.1		0.1	0.1
Braconidae				0.6 ± 1.2			0.1	0.1
PSOCOPTERA								
Psocidae				0.6 ± 1.2			0.1	0.1
THYSANOPTERA								
Thripidae						0.7 ± 1.5	0.1	0.1
CHILOPODA		1.9 ± 3.0					0.3	0.3
DIPLOPODA		1.0 ± 2.1					0.2	0.2
ARACHNIDS	0.8 ± 0.9	24.0 ± 16.4			1.1 ± 2.2	0.4 ± 0.7	4.4	4.3
OTHERS	0.5 ± 1.0	3.0 ± 3.5					0.6	0.6
TOTALS	56	400	26	31	33	73	103.1	

Table D.19. Mean number (± standard deviation) of benthic macroinvertebrates per 100 cubic meters (collected by drift sample) in Tacoma Creek, WA, 1989.

	MARCH	JUNE	JULY	SEPTEMBER	OCTOBER	MEAN	% ABUND
TRICHOPTERA							
Glossosomatidae				0.3 ± 0.4		0.1	< 0.1
Brachycentridae	139.0 ± 154.4	2.0 ± 2.3		2.4 ± 1.6	0.7 ± 0.9	28.8	18.2
Hydropsychidae				0.3 ± 0.4		0.1	< 0.1
Rhyacophilidae	0.3 ± 0.4			0.9 ± 1.2		0.2	0.2
Polycentropodidae		0.1 ± 0.1				< 0.1	< 0.1
EPHEMEROPTERA							
Heptageniidae	39.7 ± 44.1	2.2 ± 2.2		1.5 ± 0.4		8.7	5.5
Ephemerellidae	78.4 ± 88.8	4.8 ± 4.2		1.8 ± 0.1	0.7 ± 0.9	17.1	10.8
Baetidae	39.3 ± 44.3	4.6 ± 4.3	0.4 ± 0.3	20.9 ± 19.9	9.0 ± 0.4	14.8	9.4
Leptophlebiidae			0.4 ± 0.4			0.1	0.1
PLECOPTERA							
Nemouridae	0.3 ± 0.4			1.5 ± 0.4		0.4	0.2
Perlodidae	39.0 ± 44.5			1.8 ± 2.5	0.7 ± 0.9	8.3	5.3
COLEPTERA							
Elmidae larvae		10.6 ± 11.2	2.2 ± 1.3	24.1 ± 13.0	1.1 ± 1.5	7.6	4.8
Elmidae adults		6.0 ± 6.9		3.0 ± 0.7	0.7 ± 0.9	1.9	1.2
Dytiscidae				0.3 ± 0.4		0.1	< 0.1
Georyssidae			23.4 ± 6.8	0.3 ± 0.4		4.7	3.0
LEPIDOPTERA							
Pyralidae		0.2 ± 0.3		0.3 ± 0.4		0.1	0.1
DIPTERA							
Chironomidae larvae	138.0 ± 154.9	0.4 ± 0.5	2.6 ± 1.7	4.8 ± 0.6	1.1 ± 1.5	29.4	18.6
Chironomidae pupae		2.4 ± 2.1		3.6 ± 0.2		1.2	0.8
Simuliidae	0.3 ± 0.4	7.5 ± 6.2	0.4 ± 0.4	2.1 ± 0.5	1.9 ± 1.1	2.4	1.5
Psychodidae	40.9 ± 43.5				4.5 ± 4.8	9.1	5.7
Dixidae				0.6 ± 0.9		0.1	0.1
HYDRACARINA	20.3 ± 21.8		0.4 ± 0.4	0.9 ± 1.3	0.7 ± 0.9	4.5	2.8
ANNELIDA							
Lumbriculidae	20.6 ± 21.6					4.1	2.6
MOLLUSCA							
Sphaeriidae	0.6 ± 0.7	2.0 ± 2.3				0.5	0.3
TERRESTRIAL INSECTS							
DIPTERA							
Chironomidae		0.1 ± 0.1		0.3 ± 0.4		0.1	0.1
Simuliidae		0.2 ± 0.3		7.1 ± 10.1		1.5	0.9
Empididae				4.2 ± 1.0		0.8	0.5

Table D.19. (cont.)

	MARCH	JUNE	JULY	SEPTEMBER	OCTOBER	MEAN	% ABUND
Chamaemyiidae				0.3 ± 0.4		0.1	< 0.1
TRICHOPTERA		0.1 ± 0.1				< 0.1	< 0.1
EPHEMEROPTERA							
Baetidae				7.0 ± 5.0		1.4	0.9
Heptageniidae				0.3 ± 0.4		0.1	< 0.1
COLEOPTERA							
Crytophagidae				0.3 ± 0.4		0.1	< 0.1
Lathridiidae		0.2 ± 0.3				< 0.1	< 0.1
HOMOPTERA							
Aphididae	0.3 ± 0.4	32.3 ± 33.4		0.3 ± 0.4		6.6	4.2
Cicadellidae				0.6 ± 0.9		0.1	0.1
HYMENOPTERA							
Formicidae		2.0 ± 2.3	1.8 ± 0.6	3.4 ± 2.3		1.4	0.9
Braconidae		4.0 ± 4.6				0.8	0.5
PSOCOPTERA							
Psocidae		2.0 ± 2.3		0.3 ± 0.4		0.5	0.3
ARACHNIDS				0.6 ± 0.9		0.1	0.1
OTHERS			0.4 ± 0.4			0.1	0.1
TOTALS	557	84	32	96	21	158.0	

Table D.20. Mean number (± standard deviation) of benthic macroinvertebrates per 100 cubic meters (collected by drift sample) in Skookum Creek, WA, 1989.

	MARCH	APRIL	JUNE	JULY	SEPTEMBER	OCTOBER	MEAN	% ABUND
TRICHOPTERA								
Glossosomatidae			0.2 ± 0.4			2.3 ± 2.6	0.4	0.4
Brachycentridae	4.4 ± 5.7	5.5 ± 4.7	10.2 ± 14.7	0.7 ± 1.3	0.8 ± 1.6	0.7 ± 1.2	3.7	3.8
Hydropsychidae	1.3 ± 2.6			0.3 ± 0.7		0.4 ± 0.7	0.3	0.3
Limnephilidae	0.3 ± 0.4		1.1 ± 2.3	0.6 ± 0.7		0.7 ± 1.2	0.5	0.5
Rhyacophilidae		0.5 ± 1.1	3.4 ± 6.8	1.6 ± 1.3	0.8 ± 1.0	0.8 ± 0.9	1.2	1.2
EPHEMEROPTERA								
Heptageniidae	10.9 ± 14.5	3.6 ± 2.8	3.4 ± 3.4	1.3 ± 1.5	1.8 ± 3.5	19.6 ± 14.9	6.8	7.0
Ephemerellidae	1.2 ± 1.9	2.8 ± 3.0	14.6 ± 17.3			3.7 ± 5.7	3.7	3.8
Baetidae	30.3 ± 31.1	12.1 ± 5.2	39.7 ± 29.6	4.6 ± 7.5	28.3 ± 16.1	32.4 ± 23.0	24.6	25.4
Leptophlebiidae	1.3 ± 1.1		1.1 ± 2.3	0.3 ± 0.7	0.6 ± 1.2	2.0 ± 3.7	0.9	0.9
Tricorythidae					0.8 ± 1.6		0.1	0.1
PLECOPTERA								
Chloroperlidae		2.8 ± 3.0	1.1 ± 2.3	2.0 ± 2.5		3.7 ± 5.7	1.6	1.7
Nemouridae	6.4 ± 7.1	0.1 ± 0.3			0.5 ± 1.1		1.2	1.2
Perlodidae	0.6 ± 1.3					3.1 ± 4.8	0.6	0.6
Peltoperlidae		0.2 ± 0.5					< 0.1	< 0.1
COLEPTERA								
Elmidae larvae	4.2 ± 4.9		10.1 ± 8.6	4.3 ± 4.3	6.0 ± 5.3	5.6 ± 5.4	5.0	5.2
Elmidae adults		0.5 ± 1.1	1.4 ± 1.9		0.8 ± 1.6	4.4 ± 3.2	1.2	1.2
Hydrophilidae			0.7 ± 1.4				0.1	0.1
Dytiscidae			1.6 ± 2.2				0.3	0.3
Georyssidae			0.3 ± 0.7				0.1	0.1
DIPTERA								
Chironomidae larvae	18.9 ± 20.0	10.1 ± 1.2	48.1 ± 77.2	0.7 ± 1.3	9.4 ± 8.9	0.4 ± 0.7	14.6	15.1
Chironomidae pupae	2.2 ± 2.2	30.7 ± 21.8	7.6 ± 9.6		24.3 ± 13.3	0.8 ± 0.9	10.9	11.3
Ceratopogonidae	0.6 ± 1.3						0.1	0.1
Tipulidae	0.6 ± 1.3	2.7 ± 3.1				0.5 ± 0.8	0.6	0.7
Simuliidae	7.3 ± 10.1		3.7 ± 4.2	0.7 ± 1.3	0.3 ± 0.5	5.6 ± 6.8	2.9	3.0
Psychodidae	2.0 ± 2.5					3.7 ± 5.7	1.0	1.0
Muscidae	1.3 ± 2.6						0.2	0.2
HYDRACARINA	1.5 ± 3.1	0.2 ± 0.5	9.1 ± 5.8		3.3 ± 2.8	0.3 ± 0.6	2.4	2.5
ANNELIDA								
Lumbriculidae	3.8 ± 3.7		1.1 ± 2.3			1.1 ± 1.2	1.0	1.0
PLATYHELMINTHES								
Planariidae					0.2 ± 0.4		< 0.1	< 0.1
NEMATODA	0.1 ± 0.3						< 0.1	< 0.1

Table D.20. (cont.)

	MARCH	APRIL	JUNE	JULY	SEPTEMBER	OCTOBER	MEAN	% ABUND
MOLLUSCA								
Sphaeriidae	5.3 ± 5.8	2.7 ± 3.1	12.5 ± 25.0		0.2 ± 0.4	0.3 ± 0.6	3.5	3.6
TERRESTRIAL INSECTS								
COLLEMBOLA	4.2 ± 4.9		10.6 ± 14.8			2.6 ± 3.0	2.9	3.0
DIPTERA								
Chironomidae					0.5 ± 0.6			
Simuliidae					0.8 ± 1.6	0.9 ± 1.0	0.3	0.3
Empididae					0.2 ± 0.4		< 0.1	< 0.1
Mycetophilidae					0.2 ± 0.4		< 0.1	< 0.1
Bibionidae						0.3 ± 0.6		
Asilidae					0.3 ± 0.5		0.1	0.1
TRICHOPTERA					0.5 ± 0.6		0.1	0.1
EPHEMEROPTERA								
Baetidae					1.4 ± 1.7	0.7 ± 1.2	0.4	0.4
COLEOPTERA								
Salpingidae						0.4 ± 0.7	0.1	0.1
Staphylinidae		1.3 ± 3.0			0.3 ± 0.5		0.3	0.3
HOMOPTERA								
Aphididae		2.7 ± 3.1	0.4 ± 0.7			9.6 ± 15.1	2.1	2.2
Cicadellidae						0.3 ± 0.6	0.1	0.1
HYMENOPTERA								
Formicidae			0.4 ± 0.7		0.5 ± 0.6	0.9 ± 1.0	0.3	0.3
Ichneumonidae					0.2 ± 0.4		< 0.1	< 0.1
PSOCOPTERA								
Psocidae					0.3 ± 0.5		0.1	0.1
THYSANOPTERA								
Thripidae			1.8 ± 2.7				0.3	0.3
ARACHNIDS					0.3 ± 0.5	0.5 ± 0.8	0.1	0.1
TOTALS	109	79	184	17	84	109	96.7	

APPENDIX E

MONTHLY ZOOPLANKTON DENSITIES AT PEND OREILLE RIVER MID-CHANNEL AND LITTORAL STUDY SITES

Table E.1. Mean monthly zooplankton densities (organisms/liter) for Pend Oreille River study sites (mid-channel) during March, 1989.

						T6		T8	T9	T10	T11	Mean
Chydoridae												
Alona guttata	0.05					0.04					0.04	0.01
Chydorus sphaericus	0.25	0.70	0.19	1.63		0.09	0.18		0.22	0.26	1.46	0.45
Bosminidae												
Bosmina longirostris	0.15	0.07	0.32	0.07	0.97	0.17	0.09	0.23	0.15	0.10	0.24	0.23
TOTAL **CLADOCERA**	**0.45**	**0.77**	**0.51**	**1.7**	**0.97**	**0.3**	**0.27**	**0.23**	**0.37**	**0.36**	**1.74**	**0.70**
Cyclopoida												
Diacyclops bicuspidatus thomasi	2.09	1.05	2.30	1.00	1.49	1.03	2.34	2.21	1.09	0.58	0.81	1.45
Calanoida												
Episura nevadensis							0.18					0.02
Leptodiaptomus ashlandi	3.64	1.76	1.47	1.76	2.15	1.54	2.98	2.32	1.96	1.46	1.29	2.03
Harpacticoida												
Bryocamptus spp.	0.05					0.13		0.17	0.07	0.05		0.04
Nauplii	6.77	2.98	3.51	3.97	4.00	2.83	5.68	4.18	4.72	3.61	2.53	4.07
TOTAL **COPEPODA**	**12.55**	**5.79**	**7.28**	**6.73**	**7.64**	**5.53**	**11.18**	**8.88**	**7.84**	**5.70**	**4.63**	**7.61**
Asplanchna herricki	0.30	0.21	0.38	0.33	0.46	0.04				0.05	0.11	0.17
Asplanchna priodonta	0.05	0.42	0.19	0.30	0.10	0.13		0.17	0.07	0.21	0.02	0.15
Collotheca pelagica	0.25						0.27		0.36	0.37	0.05	0.12
Colurella uncinata								0.12				0.01
Conochilus unicornis		0.12		0.04	0.05			0.23				0.04
Epiphanes spp.	0.30	0.05	0.13	0.30	0.10	0.13	1.26		0.36	1.10	0.11	0.35
Filinia longiseta	0.25					0.04		0.06				0.03
Filinia terminalis	0.10	0.02		0.06								0.02
Kellicottia bostoniensis							0.09	0.06		0.10		0.02
Kellicottia longispina	0.15	0.05	0.06	0.26	0.31	0.17		0.17	0.36	0.10	0.09	0.16
Keratella hiemalis			0.06							0.16		0.02
Keratella spp	0.35	0.61		0.37	0.15	0.34	0.54	0.35	0.15		0.40	0.30
Lecane luna	0.30		0.06									0.03
Lecane spp.								0.06				0.01
Notholca acuminata var. *extensa*	0.25	0.16	0.57	0.33	0.51	0.26	0.36	0.17	0.29	0.26		0.29
Notholca spp.											0.32	0.03
Notholca squamula	1.00	0.05	0.45	0.32	0.41	0.04	0.27	0.23	0.22	0.21		0.29
Polyarthra dolichoptera	0.20	0.03	0.19	0.20	0.05	0.04	0.27	0.23	0.44			0.15
Polyarthra spp.											0.11	0.01
Testudinella patina f. triloba								0.06				0.01
Trichocerca lata	0.05										0.02	0.01
Trichocerca rattus											0.05	0.00
Trichotria pocillum							0.09					0.01
TOTAL **ROTIFERA**	**3.55**	**1.72**	**2.09**	**2.51**	**2.14**	**1.19**	**3.15**	**1.91**	**2.25**	**2.82**	**1.28**	**2.24**
TOTAL **ZOOPLANKTON**	**16.55**	**8.28**	**9.88**	**10.94**	**10.75**	**7.02**	**14.60**	**11.02**	**10.46**	**8.88**	**7.65**	**10.55**
Ostracoda	0.10											0.01

Table **E.2.** Mean monthly **zooplankton** densities (organisms/liter) for **Pend Oreille** River study sites (mid-channel) during April, **1989.**

	T3	T10	T11	Mean
Daphnidae				
Daphnia thorata		0.06		0.02
Chydoridae				
Chydorus sphaericus	0.77	0.12	0.34	0.41
Bosminidae				
Bosmina longirostris	2.32	1.20	1.48	1.67
Macrothrix spp.		0.06		0.02
TOTAL **CLADOCERA**	**3.09**	**1.44**	**1.82**	**2.12**
Cyclopoida				
Diacyclops bicuspidatus thomasi	5.68	4.15	4.22	4.68
Calanoida				
Leptodiaptomus ashlandi	5.23	3.25	3.29	3.92
Harpacticoida				
Bryocamptus spp.	5.29	1.38	1.01	2.56
Nauplii	15.56	13.94	10.93	13.48
TOTAL **COPEPODA**	**31.76**	**22.72**	**19.45**	**24.64**
Asplanchna herricki	0.58	0.48	0.13	0.40
Asplanchna priodonta	0.32			0.11
Collotheca pelagica	5.42	2.89	2.41	3.57
Epiphanes spp.			0.60	0.20
Euchlanis triquetra	0.77	0.90		0.56
Kellicottia bostoniensis	0.19	0.06	0.20	0.15
Kellicottia longispina	2.78	1.62	1.61	2.00
Keratella spp.	2.97	1.74	0.94	1.88
Lecane luna	0.45	0.12		0.19
Monostyla lunaris	0.06			0.02
Notholca acuminata var. extensa	0.71			0.24
Notholca spp.		0.42	0.67	0.36
Notholca squamula	0.65			0.22
Polyarthra dolichoptera	0.65	1.02		0.56
Polyarthra major	0.13			0.04
Polyarthra remata		0.12		0.04
Polyarthra spp.			0.74	0.25
Polyarthra vulgaris	0.19			0.06
Testudinella patina f. triloba	1.55		0.20	0.58
TOTAL **ROTIFERA**	**17.42**	**9.37**	**7.50**	**11.43**
TOTAL **ZOOPLANKTON**	**52.27**	**33.53**	**28.77**	**38.19**
Ostracoda	0.26	0.30	0.34	0.30

Table E.3. Mean monthly zooplankton densities (organisms/liter) for Pend Oreille River study sites (mid-channel) during June, 1989.

	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	Mean
Daphnidae												
Ceriodaphnia quadrangula						0.24	0.04		0.12			0.04
Ceriodaphnia recticulata		4.36										0.40
Daphnia galeata mendota		0.40	0.21	0.17		0.02	0.02	0.02		0.38	0.09	0.12
Daphnia parvula	0.43											0.04
Daphnia pulicaria											0.09	0.01
Daphnia thorata					0.09							0.01
Megafenstra aurita	0.43				0.09							0.05
Chydoridae												
Alona guttata			0.53		0.09			0.02		0.15	0.09	0.08
Camptocercus rectirostris					0.09							0.01
Chydorus sphaericus	0.21	0.74		0.17	0.26	0.47	0.27			0.08		0.20
Bosminidae												
Bosmina longirostris	9.99	17.56	11.48	4.88	7.69	6.83	5.81	9.80	4.48	10.24	11.98	9.16
Macrothricidae												
Sididae												
Diaphanosoma brachyurum	0.43						0.06	0.02		0.08	0.09	0.06
Sida crystallina					0.09		0.02	0.02	0.12			0.02
TOTAL **CLADOCERA**	**11.49**	**23.06**	**12.22**	**5.22**	**8.4**	**7.56**	**6.22**	**9.88**	**4.72**	**10.93**	**12.34**	**10.19**
Cyclopoida												
Diacyclops bicuspidatus thomasi	2.55	6.87	5.42	5.75	7.86	2.83	5.13	6.83	8.09	8.56	16.52	6.95
Calanoida												
Episura nevadensis			0.11	0.17								0.03
Leptodiaptomus ashlandi	0.85	0.79	0.74	0.17	0.68	0.71	0.81	1.09	0.50	0.76	1.36	0.77
Harpacticoida												
Bryocamptus spp.		0.53										0.05
Nauplii	8.72	55.72	7.02	4.71	9.57	9.42	6.08	12.08	10.21	15.14	21.88	14.60
TOTAL **COPEPODA**	**12.12**	**63.91**	**13.29**	**10.80**	**18.11**	**12.96**	**12.02**	**20.00**	**18.80**	**24.46**	**39.76**	**22.38**
Asplanchna herricki	2.98	2.51	1.49	1.22		6.83	2.43	1.58	2.37	1.45	1.91	2.25
Asplanchna priodonta		0.40			1.11	0.47	0.27			0.23		0.23
Brachionus quadridentatus		1.06	0.32			1.18		0.10			0.36	0.27
Collotheca pelagica	0.43		2.44	1.74	1.71			3.17	3.49	5.28	6.99	2.30
Conochilus unicornis		4.49	0.43				2.03	0.10				0.64
Epiphanes spp.		0.40										0.04
Euchlanis dilatata						1.18						0.11
Euchlanis parva							0.27					0.02
Euchlanis triquetra					0.09				0.62	0.08	0.36	0.10
Filinia longiseta			0.11									0.01
Filinia terminalis										0.08		0.01
Kellicottia bostoniensis		0.40									0.18	0.05
Kellicottia longispina	20.41	50.18	15.41	11.85	13.84	16.25	14.32	17.53	11.45	13.69	17.70	18.42

Table E.3. (cont.)

	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	MEAN
Keratella spp.	350.13	560.02	299.85	261.81	179.43	381.15	257.40	293.42	236.18	233.87	297.17	304.58
Lecane luna				0.52				0.10	0.25			0.08
Monostyla quadridentata		0.13										0.01
Notholca acuminata var. *extensa*			0.21						0.25			0.04
Notholca squamula											0.09	0.01
Polyarthra remata												
Polyarthra spp.	38.48	55.72	18.60	15.69	12.39	22.85	17.97	22.18	15.44	16.74	25.60	23.79
Synchaeta spp.									0.12			0.01
Testudinella patina f. *triloba*		0.13										0.01
Trichocerca rattus							0.41				0.18	0.05
Trichotria tetractis							0.27					0.02
TOTAL **ROTIFERA**	**412.43**	**675.44**	**338.86**	**292.83**	**208.57**	**429.91**	**295.37**	**338.18**	**270.17**	**271.42**	**350.54**	**353.07**
TOTAL **ZOOPLANKTON**	**436.04**	**762.41**	**364.37**	**308.85**	**235.08**	**450.43**	**313.61**	**368.06**	**293.69**	**306.81**	**402.64**	**385.64**
Ostracoda	0.43	25.88	0.32	0.35	0.34	1.18	0.41	0.89	0.37	0.08	0.73	2.82

0
0

Table E.4. Mean monthly zooplankton densities (organisms/liter) for **Pend Oreille** River study sites (mid-channel) during July, **1989.**

	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	Mean
Daphnidae												
Ceriodaphnia quadrangula			0.06	0.07				0.06	0.27	0.19	0.09	0.07
Ceriodaphnia recticulata							0.12					0.01
Ceriodaphnia spp.	0.04											0.004
Daphnia ambigua						0.19		0.08				0.02
Daphnia galeata mendota	1.03	0.19	0.67	1.39	0.86		0.12	1.05	0.36	1.00	0.61	0.66
Daphnia parvula			0.12		0.04						0.09	0.02
Daphnia pulicaria			0.06	0.07			0.24				0.09	0.04
Daphnia retrocurva	0.94	0.81	0.48	1.12	1.00	0.68	1.45	0.38	0.45	1.12	1.74	0.92
Daphnia thorata	1.12	0.37	0.73	0.40	0.41	0.19	0.48	0.23	0.09	0.37	0.35	0.43
Simocephalus serrulatus	0.01					0.10						0.01
Simocephalus vetulus									0.05			0.005
Chydoridae												
Camptocercus rectirostris										0.06		0.01
Chydorus sphaericus		0.06	0.06	0.07		0.10			0.27			0.05
Bosminidae												
Bosmina longirostris	3.89	0.87	3.63	4.29	4.54	4.36	8.35	6.31	5.99	6.29	7.06	5.05
Sididae												
Diaphanosoma birgei	0.22	0.19	0.48	0.20	0.59	0.19	0.36	0.30	0.18	0.44	0.52	0.33
Sida crystallina	0.49	0.12	0.18	0.05	0.04	0.10	0.12	0.30	0.27		0.09	0.16
Leptodoridae												
Leptodora kindti	0.01		0.05	0.11	0.05			0.03		0.12		0.03
TOTAL **CLADOCERA**	**7.75**	**2.61**	**6.52**	**7.77**	**7.53**	**5.91**	**11.24**	**8.74**	**7.93**	**9.65**	**10.64**	**7.84**
Cyclopoida												
Diacyclops bicuspidatus thomasi	7.37	11.27	12.22	13.34	15.43	14.91	17.91	18.18	9.35	13.57	22.75	14.21
Macrocyclops albidus					0.05		0.48	0.08			0.09	0.06
Macrocyclops ater			0.06			0.10						0.01
Calanoida												
Episura nevadensis	0.04		0.15		0.04	0.10		0.15	0.09		0.17	0.07
Leptodiaptomus ashlandi	1.97	1.18	4.78	4.23	2.63	2.81	4.72	8.19	2.36	2.99	2.09	3.45
Harpacticoida												
Bryocamptus spp.	0.04		0.06									0.01
Nauplii	5.36	8.28	5.14	7.40	5.67	6.29	11.01	8.72	9.35	7.35	11.42	7.82
TOTAL **COPEPODA**	**14.78**	**20.73**	**22.41**	**24.97**	**23.82**	**24.21**	**34.12**	**35.32**	**21.15**	**23.91**	**36.52**	**25.63**
Asplanchna herricki								0.08	0.09			0.02
Asplanchna priodonta			0.06								0.05	0.01
Brachionus quadridentatus	0.18		0.36	0.26		0.10	0.73	0.53	0.45	0.06	0.35	0.27
Collotheca pelagica				0.07	0.18					1.06	0.35	0.15
Colurella uncinata						0.10		0.23				0.03
Conochilus unicornis	0.04	0.31	0.18	0.13	0.41			1.43	0.54	0.25		0.30

Table E.4. (cont.)

	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	MEAN
Euchlanis parva		0.25		2.44	0.45			1.65				0.44
Euchlanis spp.	0.40		0.67			4.55	1.33		22.60		1.31	2.81
Euchlanis triquetra								0.15				0.01
Filinia longiseta				4.82								0.44
Kellicottia bostoniensis		0.12	0.12								0.17	0.04
Kellicottia longispina	4.38	2.86	5.87		4.49	2.32	5.20	9.32	5.08	5.85	6.71	4.73
Keratella spp.	8.09	11.39	12.53	8.65	5.72	4.84	10.05	11.87	9.44	9.28	20.48	10.21
Lecane spp.									0.09			0.01
Monostyla lunaris								0.23		0.19	0.09	0.05
Monostyla quadridentata					0.09						0.26	0.03
Monostyla spp.	0.13								0.73			0.08
Mytilina ventralis var. *macracantha*									0.09			0.01
Notholca acuminata var. *extensa*						0.10						0.01
Notholca squamula								0.08				0.01
Platyias patulus									0.09			0.01
Pleosoma lenticulare		0.44			0.09							0.05
Pleosoma truncatum						0.10		0.30				0.04
Polyarthra spp.	11.04	11.14	7.69	6.67		7.94	15.25		11.98	20.11	22.92	10.43
Synchaeta spp.	0.09	0.12			8.17			0.08				0.77
Testudinella patina *f. triloba*						0.10				0.12		0.02
Trichocerca rattus	0.27						0.24	0.15	1.18			0.17
Trichocercus spp.						0.39						0.04
Trichotria pocillum					0.27						0.09	0.03
Trichotria spp.												
Trichotria tetractis				0.26			0.48	0.15	0.54	0.12		0.14
TOTAL **ROTIFERA**	**24.62**	**26.63**	**27.48**	**23.30**	**19.87**	**20.54**	**33.28**	**26.25**	**52.90**	**37.04**	**52.78**	**31.34**
TOTAL **ZOOPLANKTON**	**47.15**	**49.97**	**56.41**	**56.04**	**51.22**	**50.66**	**78.64**	**70.31**	**81.98**	**70.60**	**99.94**	**64.81**
Ostracoda	0.18	0.56	0.24	0.33	0.45	1.26	2.54	0.68	0.54		0.61	0.67

Table E.5. Mean monthly zooplankton densities (organisms/liter) for Pend Oreille River study sites (mid-channel) during September, 1989.

	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	Mean
Daphnidae												
Ceriodaphnia quadrangula					1.25		0.16					0.13
Ceriodaphnia recticulata				0.10		0.04				0.06		0.02
Daphnia ambigua					0.87							0.08
Daphnia galeata mendota	0.21	0.36	0.60	0.71		0.67	0.62	0.54	1.01	0.61	0.08	0.49
Daphnia pulicaria		0.12					0.03					0.01
Daphnia retrocurva	0.01			0.15		0.04	0.08		0.13	0.18	0.16	0.07
Daphnia schodleri							0.03					0.003
Daphnia thorata	0.09		0.38	0.25	0.31	0.18	0.23		0.34	0.30	0.32	0.22
Scapholeberis mucronata					0.06							0.01
Simocephalus serrulatus			0.04		0.06	0.04						0.01
Chydoridae												
Alone guttata		0.24			0.05		0.16	0.11			0.16	0.07
Camptocercus rectirostris	0.09	1.09	0.04	0.15	0.06			0.11				0.14
Chydorus sphaericus	0.18	0.73	0.09	0.10	0.87	0.04	0.39	0.54			0.08	0.27
Eurycercus lamellatus							0.06					0.01
Graptoleberis testudinaria	0.01				0.44							0.04
Bosminidae												
Bosmina longirostris	2.06	1.94	2.09	2.33	2.55	2.04	2.10	0.98	2.42	1.69	1.35	1.96
Sididae												
Diaphanosoma birgei			0.13	0.15	0.19	0.07	0.09		0.07	0.18	0.08	0.09
Diaphanosoma brachyurum	0.15											0.01
Sida crystallina		0.24	0.04		0.06		0.39					0.07
Leptodoridae												
Leptodora kindti												
TOTAL **CLADOCERA**	**2.8**	**4.72**	**3.41**	**3.94**	**6.77**	**3.12**	**4.34**	**2.28**	**3.97**	**3.02**	**2.23**	**3.69**
Cyclopoida												
Diacyclops bicuspidatus thomasi	0.25	0.73	0.98	1.32	1.43	0.95	0.93	0.98	1.41	0.48	1.19	0.97
Macrocyclops albidus				0.20		0.04						0.02
Macrocyclops ater			0.17	0.20	0.12	0.21	0.23		0.13	0.18	0.08	0.12
Calanoida												
Episura nevadensis			0.04	0.10	0.06	0.04	0.08		0.07	0.06		0.04
Leptodiaptomus ashlandi	0.37	0.48	0.68	1.17	1.31	0.60	0.93	0.54	1.21	0.91	1.43	0.88
Skistodiaptomus oregonensis			0.21	0.35	0.19	0.21	0.39	0.33	0.60	0.12	0.16	0.23
Harpacticoida												
Bryocamptus spp.			0.04			0.04						0.01
Nauplii	1.57	1.45	2.35	3.14	2.43	2.95	7.24	4.90	2.82	2.42	3.96	3.20
TOTAL **COPEPODA**	**2.19**	**2.66**	**4.47**	**6.48**	**5.54**	**5.04**	**9.80**	**6.75**	**6.24**	**4.17**	**6.82**	**5.47**

Table E.5. (cont.)

	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	MEAN
Asplanchna priodonta	0.01							0.11				0.01
Brachionus quadridentatus								0.11			0.08	0.02
Collotheca pelagica			0.17			0.18			0.13	0.24	0.08	0.07
Colurella uncinata					1.12	0.04						0.11
Conochilus unicornis	1.53	6.05	2.18	1.98		2.81	2.72	2.51	3.16	2.30	1.51	2.43
Euchlanis dilatata			0.04			0.04						0.01
Euchlanis parva	0.06			0.05				0.98			0.08	0.11
Euchlanis pellucida						0.14						0.01
Euchlanis spp.		33.17					1.40					3.14
Euchlanis triquetra					0.06					0.06		0.01
Kellicottia bostoniensis					0.12							0.01
Kellicottia longispina	8.07	10.17	4.31	5.67	4.61	9.38	12.76	11.41	12.91	7.81	15.85	9.36
Keratella serrulata f. curvicornis		0.12		0.05								0.02
Keratella cochlearis cochlearis			0.26			0.25		0.98	0.40		0.32	0.20
Keratella crassa		1.33	0.17	0.15					0.20		0.16	0.18
Keratella hiemalis						0.04						0.004
Keratella quadrata		0.48		0.05				0.22				0.07
Keratella spp.	0.64						1.09			1.76		0.32
Lecane luna		0.36			0.25	0.07	0.23					0.08
Lecane spp.		0.12										0.01
Monostyla lunaris	0.06	0.97				0.11	0.31					0.13
Monostyla quadridentata	0.03	0.12			0.06	0.04	0.08					0.03
Mytilina ventralis var. *macracantha*		2.42			0.06		0.31	0.33				0.28
Platyias patulus			0.04				0.08					0.01
Pleosoma lenticulare	0.12		0.09	0.41	0.19	0.21		0.76	0.20	0.24		0.20
Pleosoma spp.		1.69										0.15
Pleosoma truncatum	0.08		0.09	0.20		0.25	0.62	0.22				0.13
Polyarthra spp.	3.07	5.33	4.10	5.73	4.86	6.36	6.30	9.69	6.25	3.51	6.10	5.57
Synchaeta spp.		0.24	0.21	0.15	0.06	0.14	0.16		0.07			0.09
Testudinella patina f. triloba		0.36	0.04		0.12	0.07	0.08	0.11				0.07
Trichocerca lata			0.04									0.004
Trichocerca rattus			0.30		0.25				0.54	0.36		0.13
Trichocercus spp.	0.12	10.65				0.60	3.89				0.71	1.45
Trichotria tetractis		0.12		0.05	0.06		0.08	1.09				0.13
TOTAL **ROTIFERA**	**13.79**	**73.70**	**12.04**	**14.49**	**11.82**	**20.73**	**30.11**	**28.52**	**23.86**	**16.28**	**24.89**	**24.57**
TOTAL **ZOOPLANKTON**	**18.78**	**81.08**	**19.92**	**24.91**	**24.13**	**28.89**	**44.25**	**37.55**	**34.07**	**23.47**	**33.94**	**33.73**
Ostracoda	0.12	1.82	0.09	0.20	0.93	0.07	2.41			0.12	0.16	0.54

Table E.6. Mean monthly zooplankton densities (oranisms/liter) for Pend Oreille River study sites (mid-channel) during October, 1989.

	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	Mean
Daphnidae												
Ceriodaphnia quadrangula	0.09											0.01
Daphnia ambigua		0.93		0.31								0.11
Daphnia galeata mendota	0.47		0.04		0.49		0.32	0.35	0.09	0.35	0.60	0.25
Daphnia thorata	0.09											0.01
Simocephalus serrulatus					0.04					0.03		0.01
Simocephalus vetulus							0.05	0.09	0.05			0.02
Chydoridae												
Acroperus harpae									0.05			0.005
Alona guttata		0.05		0.04			0.05					0.01
Camptocercus rectirostris	0.09		0.04				0.05					0.02
Chydorus sphaericus	1.23		0.17	0.12	0.04	0.03	0.18		0.09	0.28		0.19
Graptoleberis testudinaria	0.09							0.09				0.02
Bosminidae												
Bosmina longirostris	4.36	1.36	1.92	2.37	1.44	1.47	1.86	3.14	1.72	1.69	3.49	2.26
Sididae												
Diaphanosoma birgei				0.04					0.05		0.11	0.02
Diaphanosoma brachyurum						0.07		0.09				0.01
TOTAL **CLADOCERA**	**6.42**	**2.34**	**2.17**	**2.88**	**2.01**	**1.57**	**2.51**	**3.76**	**2.05**	**2.35**	**4.2**	**2.9327**
Cyclopoida												
Diacyclops bicuspidatus thomasi	4.64	2.72	1.92	2.37	2.43	2.39	2.77	4.53	2.87	3.09	2.61	2.94
Macrocyclops albidus							0.05					0.005
Macrocyclops ater	0.38	0.05		0.04		0.03						0.05
Calanoida												
Episura nevadensis	0.09					0.03						0.01
Leptodiaptomus ashlandi	1.33	0.76	0.43	0.51	0.62	0.68	0.64	1.13	0.56	0.35	0.87	0.72
Skistodiaptomus oregonensis				0.12				0.44	0.14			0.06
Nauplii	7.96	3.27	1.79	1.67	1.65	2.19	2.22	3.66	1.53	2.11	2.40	2.77
TOTAL **COPEPODA**	**14.40**	**6.80**	**4.14**	**4.71**	**4.70**	**5.32**	**5.68**	**9.76**	**5.10**	**5.55**	**5.88**	**6.55**
Rotifera												
Argonotholca foliacea								0.09				0.01
Asplanchna herricki			0.04									0.004
Brachionus quadridentatus			0.09						0.09			0.02
Collotheca pelagica	3.79		0.04	0.04	0.08	0.14	0.05	0.26	0.37		0.33	0.46
Colurella uncinata	0.19								0.32	0.07		0.05
Conochilus unicornis	38.37	0.98	0.17	0.12	0.99		0.09	0.78	0.09	1.05	0.49	3.92
Euchlanis parva		0.05										0.005
Euchlanis pellucida	0.09											0.01
Euchlanis triquetra		0.11	0.17			0.03	0.18		0.05			0.05
Filinia longiseta				0.04								0.004

Table E.6. (cont.)

	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	MEAN
Kellicottia bostoniensis	0.66		0.09	0.08	0.12		0.09					0.09
Kellicottia longispina	71.05	22.44	10.47	8.79	6.46	8.51	11.49	11.33	10.57	13.35	10.62	16.83
Keratella spp.	10.70	1.85	0.73	0.97	0.66	2.36	0.68	1.13	1.67	0.84	1.03	2.06
Lecane luna						0.07						0.01
Monostyla lunaris		0.22		0.04		0.10	0.05		0.05			0.04
Monostyla quadridentata						0.03						0.003
Monostyla spp.	0.47											0.04
Notholca acuminata var. extensa	0.09											0.01
Notholca squamula		0.05										0.005
Pleosoma truncatum	0.09											0.01
Polyarthra spp.	19.42	5.34	3.03	3.07	1.44	3.83	2.13	3.57	3.80	3.87	3.16	4.79
Synchaeta spp.	0.38				0.04			0.09				0.05
Testudinella patina f. triloba	0.38	0.05	0.13	0.08	0.12	0.03	0.09		0.05	0.14	0.05	0.10
Trichocerca lata		0.98	0.81		0.08	0.03		0.26	0.23			0.22
Trichocerca rattus		0.05	0.04		0.12	0.14		0.35		0.49	0.22	0.13
Trichocercus spp.	1.52	0.05	0.13	0.66			1.09					0.31
Trichotria pocillum	0.57			0.04			0.05					0.06
Trichotria spp.		0.44	0.09									0.05
Trichotria tetractis				0.04				0.09	0.05		0.05	0.02
TOTAL **ROTIFERA**	**147.77**	**32.61**	**16.03**	**13.97**	**10.11**	**15.27**	**15.99**	**17.95**	**17.34**	**19.81**	**15.95**	**29.35**
TOTAL **ZOOPLANKTON**	**168.59**	**41.75**	**22.34**	**21.56**	**16.82**	**22.16**	**24.18**	**31.47**	**24.49**	**27.71**	**26.03**	**38.83**
Ostracoda					0.04		0.05	0.09				0.02

Table E.7 Mean monthly **zooplankton** densities (organisms/liter) for **Pend Oreille** River study sites (littoral) during **March,1989.**

	T1	T2	T3A	T4	T5	T6	T6A	T7	T8	T9	T10	T11	MEAN
Chydoridae													
Alona guttata		0.17										0.28	0.04
Chydorus sphaericus	0.23	2.00	0.09	3.31	0.13		0.92		0.27	0.09	1.57	1.81	0.87
Bosminidae													
Bosmina longirostris			0.09			0.16	0.15				0.52	0.56	0.12
TOTAL **CLADOCERA**	**0.23**	**2.17**	**0.18**	**3.31**	**0.13**	**0.16**	**1.07**		**0.27**	**0.09**	**2.09**	**2.65**	**1.03**
Cyclopoida													
Diacyclops bicuspidatus thomasi	1.86	0.61	0.57	1.92		0.16	2.77	0.87	0.54	0.18	1.39	0.70	0.96
Calanoida													
Episura nevadensis										0.18	0.17		0.03
Leptodiaptomus ashlandi	2.79	0.52	0.09	1.05		3.59	7.07	0.35	3.52	0.63	4.01	0.84	2.04
Harpacticoida													
Bryocamptus spp.		3.92	0.17	0.70		0.33	3.54		0.18		2.79	0.28	0.99
Nauplii	3.02	25.28	1.48	41.14	2.75	4.25	10.61	2.09	3.70	2.89	26.32	6.28	10.82
TOTAL **COPEPODA**	**7.67**	**30.33**	**2.31**	**44.81**	**2.75**	**8.33**	**23.99**	**3.31**	**7.94**	**3.88**	**34.68**	**8.10**	**14.84**
Asplanchna herricki	0.70	0.70		1.57			0.15						0.26
Asplanchna priodonta		0.70	0.04	1.74				0.17	0.09	0.09			0.24
Collotheca pelagica	0.23		0.04	1.92							0.35	0.42	0.25
Conochilus unicornis		0.61											0.05
Epiphanes spp.	0.23	3.83		9.59			0.31	0.17	0.18	0.27	2.44	0.56	1 A7
Filinia longiseta		0.17	0.04						0.27				0.04
Kellicottia bostoniensis			0.04				0.15	0.17			0.17	0.14	0.06
Kellicottia longispina			0.26	0.70	0.65	0.49	0.31			0.09			0.21
Keratella serrulata f. curvicornis										0.18	0.35		0.04
Keratella cochlearis cochlearis									0.18				0.02
Keratella hiemalis									0.18		0.87		0.09
Keratella spp.		4.71	0.13	9.76	1.18			0.17				0.56	1.38
Lecane luna	0.70		0.04								0.17		0.08
Notholca acuminata var. *extensa*	0.70	8.89	0.31		0.39	1.96	3.38	0.35	0.90	0.45	2.09	1.67	1.76
Notholca spp.				29.81									2.48
Notholca squamula	0.48	3.92	0.09		0.26	1.63	2.77	0.17	0.81	0.45	2.79	2.23	1.30
Polyarthra dolichoptera			0.04			0.33	0.15		0.27	0.09	0.17	0.14	0.10
Polyarthra spp.	0.23												0.02
Testudinella patina f. triloba		1.13				0.16							0.11
Tetramastix opoliensis							0.15						0.01
Trichocerca rattus				1.05									0.09
Trichotria pocillum							0.15				0.35		0.04
TOTAL **ROTIFERA**	**3.27**	**24.66**	**1.03**	**56.14**	**2.48**	**4.57**	**7.52**	**1.20**	**2.88**	**1.62**	**9.75**	**5.72**	**10.07**
TOTAL **ZOOPLANKTON**	**11.17**	**57.16**	**3.52**	**104.26**	**5.36**	**13.06**	**32.58**	**4.51**	**11.09**	**5.59**	**46.52**	**16.47**	**25.94**
Ostracoda											0.52		0.04

Table **E.8.** Mean monthly **zooplankton** densities (organisms/liter) for **Pend Oreille** River study sites (littoral) during April, **1989.**

	T3A	T 10	T 11	Mean
Chydoridae				
Chydorus sphaericus	0.13	2.09	0.87	1.03
Bosminidae				
Bosmina longirostris	0.40	1.74	1.05	1.06
TOTAL **CLADOCERA**	**0.53**	**3.83**	**1.92**	**2.09**
Cyclopoida				
Diacyclops bicuspidatus thomasi	1.07	23.37	5.75	10.06
Calanoida				
Leptodiaptomus ashlandi	0.27	28.25	5.93	11.48
Harpacticoida				
Bryocamptus spp.	0.13	4.53	1.05	1.90
Nauplii	3.08	25.81	12.55	13.81
TOTAL **COPEPODA**	**4.55**	**81.96**	**25.28**	**37.26**
Asplanchna herricki		0.70	0.17	0.29
Asplanchna priodonta			0.17	0.06
Collotheca pelagica	0.13		0.52	0.22
Kellicottia longispina	0.40	1.74	0.52	0.89
Keratella cochlearis cochlearis		0.70		0.23
Keratella spp.	0.47		0.70	0.39
Lecane luna		0.70		0.23
Notholca acuminata var. extensa	0.13	0.70	0.52	0.45
Notholca squamula	0.13	0.70		0.28
Polyarthra dolichoptera		0.70	0.17	0.29
Polyarthra remata		0.70		0.23
Tetramastix opoliensis		0.35		0.12
TOTAL **ROTIFERA**	**1.26**	**6.99**	**2.77**	**3.67**
TOTAL **ZOOPLANKTON**	**6.34**	**92.78**	**29.97**	**43.03**
Ostracoda			0.17	0.06

Table E.9. Mean monthly zooplankton densities (organisms/liter) for Pend Oreille River study sites (littoral) during June, 1989.

	T1	T2	T3	T3A	T4	T5	T5A	T6	T6A	T7	T8	T9	T10	T11	Mean
Daphnidae															
Ceriodaphnia quadrangula			2.01		0.08		24.40			0.12					1.90
Ceriodaphnia recticulata	0.20			0.56					0.70		0.04	1.00			0.18
Daphnia galeata mendota	0.40			1.67		0.22	2.91	0.12		0.05					0.38
Megafenestra aurita				0.56	0.04				0.70						0.09
Simocephalus serrulatus			1.01				1.74		2.09						0.35
Chydoridae															
Alone *guttata*			4.02	0.14	0.04		3.49	1.25	0.70		0.04	0.50	0.48		0.76
Camptocercus rectirostris							0.12		0.70						0.06
Chydorus sphaericus		0.32	1.68	1.81	0.08	0.22	30.80	7.16	7.67	0.62					3.60
Leydigia leydigi				0.14			1.16		0.46						0.13
Bosminidae															
Bosmina longirostris	6.54	5.39	13.07	13.81	1.79	2.40	73.21	6.23	10.23	13.39	4.74	13.45	44.53	4.51	15.24
Sididae															
Diaphanosoma birgei							5.81								0.42
Diaphanosoma brachyurum										0.19					0.01
Sida crystallina			4.69		0.08		2.91	0.93		0.06		0.50			0.66
Leptodoridae															
Leptodora kindti					0.04										0.003
TOTAL **CLADOCERA**	**7.14**	**5.71**	**26.48**	**18.69**	**2.15**	**2.84**	**146.55**	**15.69**	**23.25**	**14.43**	**4.82**	**15.45**	**45.01**	**4.51**	**23.77**
Cyclopoida															
Diacyclops bicuspidatus thomasi	2.58	1.90	2.68	0.56	0.27	1.53	79.02	7.47	11.39	11.83	6.06	2.49	24.20	8.82	11.49
Calanoida															
Leptodiaptomus ashlandi	0.20		0.34	0.42		0.44	1.16	1.87	4.42	1.87	0.19	1.00	2.42	1.85	1.16
Harpacticoida															
Bryocamptus spp.				0.14			8.72								0.63
Nauplii	10.70	5.71	48.26	3.07	2.50	4.14	61.59	2.49	12.55	14.01	6.63	26.40	46.47	11.69	18.30
TOTAL **COPEPODA**	**13.48**	**7.61**	**51.28**	**4.19**	**2.77**	**6.11**	**150.49**	**11.83**	**28.36**	**27.71**	**12.88**	**26.39**	**27.47**	**29.12**	**28.55**
Argonotholca foliacea									7.21						0.52
Asplanchna herricki		2.54	11.06	3.07	0.68		8.13	0.62	1.16	5.60		1.99	1.94		2.63
Asplanchna priodonta	1.39	0.63	1.34	0.56	0.11	0.22	1.74			0.62			0.48	0.21	0.52
Brachionus quadridentatus			2.01		0.34		1.74	0.31							0.31
Collotheca pelagica		0.95	41.89		0.04			0.62			0.38	2.99	4.84	2.46	3.87
Conochilus unicornis							95.29		25.33	4.67		1.00			9.02
Epiphanes spp.	0.20	0.32									0.38				0.06
Euchlanis parva										0.62	1.33				0.14
Euchlanis pellucida									0.70						0.05
Euchlanis spp.			24.13				13.95	42.03				16.44			6.90
Euchlanis triquetra				0.14	0.99				25.10				2.42		2.05
Filinia longiseta					0.09										0.01
Filinia terminalis			2.01			0.22			0.23						0.18

Table E.9. (cont.)

	T1	T2	T3	T3A	T4	T5	T5A	T6	T6A	T7	T8	T9	T10	T11	MEAN
Kellicottia bostoniensis	0.40												1.94		0.17
Kellicottia longispina	22.39	16.48	14.08	1.39	2.99	5.23	2.32	0.31	13.02	33.00	7.01	21.42	47.43	8.00	13.93
Keratella cochlearis cochlearis								6.85							0.49
Keratella quadrata								0.93							0.07
Keratella spp.	438.00	228.21	511.73	4.88	9.55	31.59	70.89		87.62	593.09	17.05	231.13	260.89	55.15	181.41
Lecane luna			3.35		0.11	2.83	9.88	2.80				4.98			1.71
Lecane spp.			0.67			0.44									0.08
Monostyla lunaris									0.23						0.02
Monostyla quadridentata						0.22			0.23						0.03
Notholca acuminata var. extensa									0.70						0.05
Notholca spp.															
Notholca squamula							3.49								0.25
Polyarthra remata				0.56		1.96		1.87							0.31
Polyarthra spp.	36.45	21.87	51.61				56.94		9.76	41.41	3.22	24.41	28.07	6.56	20.02
Polyarthra vulgaris				0.42											0.03
Synchaeta spp.											0.04	0.50			0.04
Testudinella patina f. triloba				0.14											0.01
Trichocerca lata			0.67												0.05
Trichocerca rattus			4.36		0.11			0.62	1.16	0.93		0.50			0.55
Trichotria spp.									9.53						0.68
Trichotria tetractis							9.30	0.93		0.62	0.04				0.78
TOTAL **ROTIFERA**	**498.83**	**271.00**	**668.91**	**11.16**	**15.01**	**42.71**	**273.67**	**57.89**	**181.98**	**680.56**	**29.45**	**305.36**	**348.01**	**72.38**	**246.92**
TOTAL **ZOOPLANKTON**	**519.45**	**284.32**	**746.67**	**34.04**	**19.93**	**51.66**	**570.71**	**85.41**	**233.59**	**722.70**	**47.15**	**347.20**	**420.49**	**106.01**	**299.24**
Ostracoda	0.40		7.04	0.14	0.27	0.65	47.07	5.60	15.11	0.93	0.19	9.96	1.94	1.03	6.45

Table E.10. Mean monthly **zooplankton** densities (organisms/liter) for **Pend Oreille** River study sites (littoral) during July, 1989.

	T1	T2	T3	T3A	T4	T4A	T5	T5A	T6	T6A	T7	T8	T9	T10	T11	Mean
Daphnidae																
Ceriodaphnia quadrangula			0.17	2.32	3.49	0.37		469.92		0.65	0.47	1.31	2.18			32.06
Ceriodaphnia recticulata	0.20		0.34					1.74								0.15
Daphnia galeata mendota	0.40	0.44	4.86	0.68	0.09	1.71	0.44			0.22	0.09	1.09		0.67		0.71
Daphnia parvula			0.17													0.01
Daphnia retrocurva		1.31	0.17		0.17	0.31	0.22	0.44	0.11		0.09	0.13	0.82	0.84	0.37	0.33
Daphnia thorata			16.92	0.68	0.09	0.47		0.44	0.04	0.22	0.03	0.87		0.67		1.36
Megafenestra aurita								0.44								0.03
Scapholeberis mucronata								0.44								0.03
Simocephalus serrulatus					1.74	0.68	4.80		0.36			0.13	0.17			0.53
Chydoridae																
Acroperus harpae							0.22									0.01
Alona guttata		0.44		0.10	0.87		0.65									0.14
Camptocercus rectirostris			0.34	0.10												0.03
Chydorus sphaericus				0.19		1.56	4.58	3.05	0.24		0.09					0.65
Eurycercus lamellatus					0.87	0.19	1.09		0.12			0.17	0.13			0.17
Graptoleberis testudinaria						0.06	2.83									0.19
Pleuroxus spp.							0.65								0.31	0.06
Bosminidae																
Bosmina longirostris	6.64	15.28	9.55	92.45	32.69	23.82	9.59	27.46	6.54	6.30	9.46	12.20	16.34	3.35	7.16	18.59
Sididae																
Diaphanosoma birgei		0.87		0.39	0.44	0.19	0.44	2.18	0.12	0.22	0.28	1.31		0.34	0.93	0.51
Sida crystallina		1.75	0.07		1.74	0.31	6.32	0.09	0.85		0.28	0.65	3.81		1.56	1.16
Leptodoridae																
Leptodora kindti			0.13						0.04					0.07		0.02
TOTAL **CLADOCERA**	**7.24**	**20.09**	**32.72**	**96.91**	**42.19**	**29.67**	**31.83**	**506.2**	**8.42**	**7.61**	**10.79**	**17.86**	**23.448**	**5.94**	**10.33**	**56.75**
Cyclopoida																
Diacyclops bicuspidatus thomasi	37.99	15.42	1.74	9.59	13.70	14.82	18.74	3.63	4.78	5.81	12.64	5.17	45.41	23.04	14.17	
Macrocyclops albidus					0.44	2.02		55.80				0.44			0.31	3.93
Macrocyclops ater								3.92				18.52	0.54			1.53
Calanoida																
Episura nevadensis	0.20															0.01
Leptodiaptomus ashlandi		9.61	4.86	0.10	0.87	2.33		2.18	0.48	0.65	0.94	2.61	1.09	5.03	2.18	2.20
Skistodiaptomus oregonensis						4.36									0.29	
Harpacticoida																
Bryocamptus spp.	2.58		0.17		0.44		0.87									0.27
Nauplii	10.70	15.72	11.73	3.39	30.95	26.93	17.44	70.62	4.48	4.13	9.18		11.71	10.05	16.50	16.24
TOTAL **COPEPODA**	**13.48**	**63.32**	**32.18**	**5.23**	**42.29**	**44.98**	**37.49**	**151.26**	**8.59**	**9.56**	**15.93**	**34.21**	**18.51**	**60.49**	**42.03**	**38.64**
Asplanchna herricki		1.31			1.74	0.62	0.87						0.27	0.13		0.33
Asplanchna priodonta	1.39					0.16			0.04			0.87				0.16
Brachionus quadridentatus			0.17	0.10		0.16	0.22		0.36	0.65	0.37	0.22				0.15

Table E.10. (cont.)

	T1	T2	T3	T3A	T4	T4A	T5	T5A	T6	T6A	T7	T8	T9	T10	T11	MEAN
Collotheca pelagica			0.17						0.61					0.50	6.23	0.50
Colurella uncinata					0.87	1.40					0.19	0.65		0.17		0.22
Conochilus unicornis					4.80		14.82	8.72	1.33	0.43	0.84	4.58				2.37
Epiphanes spp.	0.20															0.01
Euchlanis parva				0.19	6.54	3.89										0.71
Euchlanis spp.							15.26		11.38	6.74	6.37	26.80	28.32		8.41	6.89
Euchlanis triquetra		2.18	0.34	0.77	3.49	3.11		0.87						0.50		0.75
Filinia terminalis															0.62	0.04
Kellicottia bostoniensis	0.40														8.72	0.61
Kellicottia longispina	22.39	9.17	7.71	2.32	5.67	7.00	3.27		2.18	5.22	2.44	9.15	6.54	3.18		5.75
Keratella cochlearis cochlearis			0.87	19.18											1.34	
Keratella quadrata					0.87											0.06
Keratella spp.	438.00	11.79	9.22			6.23	11.33		9.68	4.35	4.50	18.95	9.53	8.04	72.23	40.26
Lecane luna				5.81	13.08	0.16	1.53	0.44	0.12	1.74		0.87	4.63		0.93	1.95
Lecane spp.				0.48	.											0.03
Monostyla lunaris			0.17		10.03	0.62	21.36	2.18		1.74	0.28	5.66	6.54	0.17		3.25
Monostyla quadridentata					2.62	0.47	4.14	0.44		1.74					0.93	0.69
Monostyla spp.									2.54							0.17
Mytilina ventralis var. macracantha			0.10												0.01	
Notholca acuminata var. *extensa*		0.17													0.01	
Notholca spp.																
Notholca squamula					1.74	0.16				0.43	0.19					0.17
Platyias patulus					0.44			60.16			0.09	0.44	0.27			4.09
Pleosoma lenticulare			0.67		3.49	0.78		0.44		0.43		0.87	0.54	0.17		0.49
Pleosoma spp.		0.44														0.03
Pleosoma truncatum				0.10	28.33	0.62	5.23	0.44		0.22				0.17		2.34
Polyarthra spp.	36.45	22.71		1.74	29.64	11.99	19.18	19.18	7.63	9.57	9.93	17.21	11.98	16.76	35.18	16.61
Synchaeta spp.				0.19				28.77			0.37					1.96
Testudinella Patina f. triloba				0.10		0.16	0.65									0.06
Trichocerca lata		0.44			1.31			0.44		0.43		0.65				0.22
Trichocerca rattus					3.92	0.78	11.33	1.74		1.96	0.75	10.48	1.09			2.14
Trichocercus spp.			0.50						3.03							0.24
Trichotria pocillum										0.43						0.03
Trichotria tetractis			0.17	0.39	2.18	0.16	0.87		0.61	3.04		1.53	4.63	0.17	1.56	1.02
TOTAL **ROTIFERA**	**498.83**	**48.04**	**19.29**	**13.16**	**139.94**	**38.47**	**110.06**	**123.82**	**39.51**	**39.12**	**26.32**	**98.93**	**74.34**	**29.96**	**134.81**	**95.64**
TOTAL **ZOOPLANKTON**	**519.55**	**131.45**	**84.19**	**115.30**	**224.42**	**113.12**	**179.38**	**781.28**	**56.52**	**56.29**	**53.04**	**151.00**	**116.30**	**96.39**	**187.17**	**191.03**
Ostracoda	0.40	2.62	0.84	0.48	12.64	3.74	30.30	261.55	2.90	4.57	36.74	14.81	4.63			25.08

Table E.11. Mean monthly **zooplankton** densities (organisms/liter) for **Pend Oreille** River study sites (littoral) during September, **1989.**

	T1	T2	T3	T3A	T4	T4A	T5	T5A	T6	T6A	T7	T8	T9	T10	T11	Mean
Daphnidae																
Ceriodaphnia quadrangula				31.95	0.79	4.95		12.99			0.42	0.31				3.43
Ceriodaphnia recticulata				1.45				1.26								0.18
Ceriodaphnia spp.			0.48													0.03
Daphnia galeata mendota		1.87	0.05	0.29	0.59		0.23	0.42	0.83	0.17	0.25	0.25	1.74	0.58	1.16	0.56
Daphnia pulicaria		0.31														0.02
Daphnia retrocurva		0.31			0.20				0.21				0.17		0.29	0.08
Daphnia thorata					1.39		0.06				0.12		0.87	0.07	0.58	0.21
Simocephalus serrulatus			0.97	0.58							1.66		0.44			0.24
Simocephalus vetulus								0.07			0.83					0.06
Chydoridae																
Acroperus harpae																
Alona guttata			0.24	6.10		2.48	0.06			0.35	2.49	0.31	2.61	0.36		1.00
Camptocercus rectirostris			69.25	25.85	8.12	25.75	0.12	1.26			5.81	0.06	1.74			9.20
Chydorus sphaericus		0.31		24.98	7.53	25.26	0.17	6.28	1.04		2.08	1.49	0.87		0.10	4.67
Eurycercus lamellatus			0.10	0.29		0.99	0.06	2.09			0.42		0.87		0.10	0.33
Graptoleberis testudinaria			1.45	31.37	0.79	2.97		0.42							0.10	2.47
Leydigia leydigi													0.44			0.03
Bosminidae																
Bosmina longirostris		9.34	0.97	4.65	1.78	1.49	0.23	1.68	2.70	3.14	1.66	1.87	8.28	1.31	1.84	2.73
Sididae																
Diaphanosoma birgei			6.30			0.08		0.07				0.06		0.07		0.44
Diaphanosoma brachyurum				3.49												0.23
Sida crystallina					0.20				0.21		0.25					0.04
Leptodoridae																
Leptodora kindti																
TOTAL **CLADOCERA**		**12.14**	**79.81**	**131**	**21.39**	**63.97**	**0.93**	**26.54**	**4.99**	**3.66**	**15.99**	**4.35**	**18.03**	**2.39**	**4.17**	**25.96**
Cyclopoida																
Diacyclops bicuspidatus thomasi		3.74	21.07	6.97	3.37	8.42	0.58	12.15	3.53	1.05	7.89	0.62	3.48	1.89	2.61	5.16
Macrocyclops albidus					0.59										0.10	0.05
Macrocyclops ater		0.62		7.26	1.39	9.41	0.06	3.35			3.74		1.31		0.19	1.82
Calanoida																
Episura nevadensis												0.06			0.10	0.01
Leptodiaptomus ashlandi		1.56					0.23		1.25	0.70	0.83	0.19		0.65	1.06	0.43
Skistodiaptomus oregonensis		0.62							0.21					0.36	0.39	0.11
Harpacticoida																
Bryocamptus spp.			0.73										0.44			0.08
Nauplii		7.47	51.09	20.92	7.13	22.29	2.09	19.27	7.68	5.40	27.40	18.68	7.84	4.36	3.29	13.66
TOTAL COPEPODA		**14.01**	**72.89**	**35.15**	**12.48**	**40.12**	**2.96**	**34.77**	**12.67**	**7.15**	**39.86**	**19.55**	**13.07**	**7.26**	**7.74**	**21.31**

Table E.11. (cont.)

	T1	T2	T3	T3A	T4	T4A	T5	T5A	T6	T6A	T7	T8	T9	T10	T11	MEAN
Asplanchna herricki			0.24								0.83	0.12	0.87		0.10	0.14
Collotheca pelagica		4.98											0.87		0.19	0.40
Conochilus unicornis			5.81	4.36	0.99	4.46	0.17	2.09			0.42	1.06	3.05	0.22	1.65	1.62
Euchlanis dilatata .				1.16												0.08
Euchlanis parva		0.93			0.59						8.30	0.19				0.67
Euchlanis pellucida									0.83							0.06
Euchlanis triquetra			1.21	0.29		0.48		0.84	0.21			0.12	0.44	0.07		0.24
Kellicottia bostoniensis		0.62							0.62			0.19	0.87	0.22		0.17
Kellicottia longispina	0.12	25.84	1.94	9.88	10.70	5.45	5.00	5.45	11.62	13.41	14.11	7.85	34.84	14.09	3.97	10.95
Keratella serrulata f. curvicornis												0.25				0.02
Keratella cochlearis cochlearis			0.73		0.59	1.49		2.09	1.04	1.74		0.31	1.74			0.65
Keratella crassa		1.25		0.87								0.31			0.39	0.19
Keratella quadrata					0.20					0.17			0.44			0.05
Keratella spp.							0.41							1.53		0.13
Lecane luna		0.62	0.97	0.87	1.98			5.03		0.17	0.83	0.19		0.15		0.72
Lecane spp.								0.42								0.03
Monostyla lunaris			0.97		1.19	3.47	0.12	3.35	0.83	0.17	0.83	0.12	1.31	0.29	0.19	0.86
Monostyla quadridentata		0.31	0.24	0.87	0.20			0.84	0.21			0.06				0.18
Mytilina ventralis var. *macracantha*			1.69				0.06	0.42	0.21		1.25	0.12				0.25
Notholca acuminata var. *extensa*				1.16												0.08
Notholca squamula			0.24			0.50				0.35						0.07
Platyias patulus			0.24	0.29		0.50	0.06	0.42			0.42	0.62				0.17
Pleosoma lenticulare				2.61	5.55				0.83		2.91					0.79
Pleosoma spp.			51.09					17.17								4.55
Pleosoma truncatum	0.12			4.36	0.79	13.87	0.12		0.21				4.79			1.62
Polyarthra major				0.29												0.02
Polyarthra remata				2.03				3.35								0.36
Polyarthra spp.		7.16	8.72		8.52	10.40	3.95		9.96	9.06	6.64	11.96	20.47	8.06	5.81	7.38
Polyarthra vulgaris				2.90				2.93								0.39
Synchaeta spp.				1.16	0.79	0.50		1.26	0.21	0.35	1.25	9.59				1.01
Testudinella patina f. triloba		0.62		2.32						0.17	1.66	0.12		0.15	0.10	0.34
Trichocerca lata				0.87	2.77		0.17	1.26	0.83		0.83			0.15		0.46
Trichocerca rattus		1.87		2.03	0.59	2.48		2.93	4.98	0.35	5.40			1.16		1.45
Trichocercus spp.			2.91									1.06	10.02			0.93
Trichotria tetractis							0.06							0.29		0.02
TOTAL **ROTIFERA**	**0.24**	**44.20**	**77.00**	**38.32**	**35.45**	**43.60**	**10.12**	**49.85**	**32.59**	**25.94**	**45.68**	**34.24**	**79.71**	**26.38**	**12.40**	**37.05**
TOTAL **ZOOPLANKTON**	**0.24**	**70.35**	**229.70**	**204.47**	**69.32**	**147.69**	**14.01**	**111.16**	**50.25**	**36.75**	**101.53**	**58.14**	**110.81**	**36.03**	**24.31**	**84.32**
Ostracoda	0.25	0.62	61.02	20.62	5.35	27.24	0.48	121.48	2.49	0.70	7.89	0.44	5.23	0.29	0.39	16.97

Table **E.12.** Mean monthly **zooplankton** densities (organisms/liter) for **Pend Oreille** River study sites (littoral) during October, **1989.**

	T1	T2	T3	T3A	T4	T4A	T5	T5A	T6	T6A	T7	T8	T9	T10	T11	Mean
Daphnidae																
Ceriodaphnia quadrangula	0.29			0.65		0.06										0.07
Ceriodaphnia recticulata				0.22				0.08								0.02
Daphnia galeata mendota		0.44			0.18		0.17	0.31	0.20		0.11	0.18	0.23	0.23	0.51	0.17
Simocephalus serrulatus	0.22															0.01
Simocephalus vetulus				15.26			0.09			0.12						1.03
Chydoridae																
Acroperus harpae	0.22								0.20							0.03
Alona guttata	0.15	0.22		0.87		0.31	0.09	0.23	0.20	0.19	0.11		0.02	0.12	0.26	0.18
Camptocercus rectirostris	0.07	0.65		4.80	0.18	0.16		0.16	0.20							0.41
Chydorus sphaericus	12.86	1.74		25.50	0.73	5.45	0.26	0.47	0.20	0.19	0.80		0.19	0.23	0.26	3.26
Eurycercus lamellatus	0.15	0.87		1.96		0.78				0.06						0.25
Graptoleberis testudinaria	1.09	0.22	0.17	69.31	0.22	2.18	1.31	0.54		0.12		0.18	0.04			5.03
Leydigia leydigi				0.44				0.16								0.04
Bosminidae																
Bosmina longirostris	2.03	9.37		0.22	0.36	1.71	1.74	1.48	1.78	1.93	1.61	1.09	2.36	0.64	2.31	1.91
TOTAL **CLADOCERA**	**17.08**	**13.51**	**0.17**	**119.23**	**1.67**	**10.65**	**3.66**	**3.43**	**2.78**	**2.61**	**2.63**	**1.45**	**2.84**	**1.22**	**3.34**	**12.42**
Cyclopoida																
Diacyclops bicuspidatus thomasi	3.78	5.23	1.84	62.77	27.96	7.47	6.02	1.17	9.31	6.91	16.28	5.81	4.45	2.56	4.74	11.09
Macrocyclops albidus				28.12		0.16										1.89
Macrocyclops ater	2.11	0.65				1.09								0.06		0.26
Calanoida																
Episura nevadensis													0.05			0.003
Leptodiaptomus ashlandi		0.87	0.67	0.22	6.90	2.96	0.78	0.86	1.78	1.18	1.38	1.09	0.42	0.12	0.64	1.32
Skistodiaptomus oregonensis					1.45							0.73	0.46			0.18
Harpacticoida																
Bryocamptus spp.		0.22		8.50		0.93	0.44			0.19						0.69
Nauplii	5.30	5.66	0.50	23.76	0.54	5.29	1.39	1.17	5.55	2.80	2.52	2.18	1.90	1.45	2.43	4.16
TOTAL **COPEPODA**	**11.19**	**12.63**	**3.01**	**123.37**	**36.85**	**17.90**	**8.63**	**3.20**	**16.64**	**11.08**	**20.18**	**9.81**	**7.28**	**4.19**	**7.81**	**19.58**
Asplanchna priodonta									0.20							0.01
Brachionus quadridentatus										0.06						0.004
Cephalodella gibba				0.44		0.47										0.06
Collotheca pelagica	1.38												0.09		0.38	0.12
Colurella uncinata	0.29	0.22		1.53		0.31							0.19		0.13	0.18
Conochilus unicornis	357.13	11.33		3.05		2.18	0.61		0.59	0.06	0.11	0.18	0.09	2.03	2.69	25.34
Euchlanis parva		8.28					0.09			0.12						0.57
Euchlanis pellucida	0.29															0.02
Euchlanis spp.				2.62		1.25										0.26
Euchlanis triquetra	0.36							0.08	0.40	0.06	0.11		0.19			0.08

Table E.12. (cont.)

	T1	T2	T3	T3A	T4	T4A	T5	T5A	T6	T6A	T7	T8	T9	T10	T11	MEAN
Filinia longiseta					3.45											0.23
Filinia terminalis		0.22														0.01
Kellicottia bostoniensis	0.15	0.22									0.23				0.13	0.05
Kellicottia longispina	3.63	10.89	4.19	0.44		4.05	5.06	4.20	23.77	10.52	10.99	9.80	6.21	5.12	17.94	7.79
Keratella serrulata f. curvicornis						0.47		0.08	0.59							0.08
Keratella cochlearis cochlearis					0.18		0.17		1.98						0.64	0.20
Keratella crassa							0.09		0.40			0.18	0.37		0.26	0.09
Keratella hiemalis							0.09									0.01
Keratella quadrata								0.16	0.20							0.02
Keratella spp.	0.51	2.83				0.62				0.56	1.15			0.17		0.39
Lecane luna	0.07					0.16	0.09			0.06	0.11					0.03
Lecane spp.				4.80												0.32
Monostyla lunaris	1.09	0.65					0.44		0.20	0.25	0.69		0.05			0.22
Monostyla quadridentata	0.07	1.09					0.35		0.20			0.18				0.13
Monostyla spp.			0.34	1.09		0.62		0.08						0.06		0.15
Notholca acuminata var. *extensa*							0.52									0.03
Notholca spp.	0.36			3.27				0.70	0.20							0.30
Notholca squamula							0.35									0.02
Platyias patulus				0.87												0.06
Pleosoma spp.	2.76						0.26									0.20
Polyarthra major												3.63				0.24
Polyarthra spp.		5.66	4.02	20.49	2.18	2.33	2.88	2.33	7.53	3.05	2.06		2.09	2.38	3.84	4.06
Synchaeta spp.															0.13	0.01
Testudinella patina f. triloba	2.47	0.44		1.53		0.31	0.26		0.40		0.23		0.05	0.06		0.38
Trichocerca lata							0.70		0.59		1.03		0.09		0.13	0.17
Trichocerca rattus							0.61		2.58	2.05		1.45	0.32		1.03	0.54
Trichocercus spp.	2.83	9.80	1.01	5.67	0.91	4.67								0.58		1.70
Trichotria pocillum									0.20							0.01
Trichotria spp.	1.09		0.17			0.16		0.39		0.31			0.09			0.15
Trichotria tetractis		0.44							0.20		0.34					0.07
TOTAL **ROTIFERA**	374.48	52.07	9.73	45.80	6.72	17.60	12.57	8.02	40.23	17.10	17.05	15.42	9.83	10.40	27.30	44.29
TOTAL **ZOOPLANKTON**	402.75	78.21	12.91	288.40	45.24	46.15	24.86	14.65	59.65	30.79	39.86	26.68	19.95	15.81	38.45	76.29
Ostracoda	0.58	0.65		44.90		2.33	0.87			0.12	0.11					3.30

APPENDIX F

SEASONAL FEEDING HABITS OF FISH FOUND IN THE PEND OREILLE RIVER

Table **F.1.** Seasonal (spring) feeding habits of **0+ largemouth** bass **(n=1)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
EPHEMEROPTERA				
Baetidae	3.0 (100.0)	3.5 (100.0)	100.0	100.0

Table **F.2.** Seasonal (spring) feeding habits of **1+** largemouth bass **(n=6)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
EPHEMEROPTERA				
Baetidae	0.3±0.5 (3.2)	0.03 (4.6)	33.3	10.7
ODONATA				
Coenagriidae	0.2±0.4 (1.6)	0.2 (25.1)	16.7	11.3
DIPTERA				
Chironomidae larvae	0.5±0.8 (4.8)	0.02 (2.3)	33.3	10.5
Chironomidae pupae	9.2±10.2 (88.7)	0.5 (66.2)	83.3	62.1
Ceratopogonidae	0.2±0.4 (1.6)	0.02 (2.3)	16.7	5.4

Table **F.3.** Seasonal (spring) feeding habits of **3+** largemouth bass **(n=3)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
EPHEMEROPTERA				
Baetidae	2.0±2.7 (54.5)	0.4 (52.0)	66.7	47.3
DIPTERA				
Chironomidae larvae	0.7±1.2 (18.2)	0.03 (4.3)	33.3	15.2
Chironomidae pupae	0.3±0.6 (9.1)	0.03 (4.3)	33.3	12.8
Ceratopogonidae	0.7±1.2 (18.2)	0.3 (39.0)	33.3	24.7

Table **F.4.** Seasonal (spring) feeding habits of **4+** largemouth bass **(n=1)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)		
OSTEICHTHYES				
Unidentifiable	1.0 (100.0)	109.6 (100.0)	100.0	100.0

Table **F.5.** Seasonal (spring) feeding habits of **6+** largemouth bass **(n=5)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
EPHEMEROPTERA				
Baetidae	0.2±0.5 (8.3)	0.3 (0.01)	20.0	8.9
AMPHIPODA				
Talitridae	0.8±1.8 (33.3)	0.02 (0.004)	20.0	16.7
OLIGOCHAETA				
Lumbriculidae	0.6±1.3 (25.0)	5.5 (0.2)	20.0	14.1
OSTEICHTHYES				
Yellow perch	0.8±0.8 (33.3)	2654.5 (99.8)	60.0	60.3

Table **F.6.** Seasonal (spring) feeding habits of **8+** largemouth bass **(n=4)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
OSTEICHTHYES				
Yellow perch	1.3±0.5 (100.0)	1092.4 (100.0)	100.0	100.0

Table **F.7.** Seasonal (spring) feeding habits of **9+** largemouth bass **(n=1)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
OSTEICHTHYES				
Yellow perch	1.0 (100.0)	8616.7 (100.0)	100.0	100.0

Table **F.8.** Seasonal (spring) feeding habits of 1 **1+** largemouth bass **(n=1)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN± SD(%)	%	%
OSTEICHTHYES				
Yellow perch	1 .0 (100.0)	120.2 (100.0)	100.0	100.0

Table **F.9.** Seasonal (spring) feeding habits of **14+** largemouth bass **(n=1)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
OSTEICHTHYES				
Yellow perch	1.0 (100.0)	6843.1 (100.0)	100.0	100.0

Table **F.10.** Seasonal (summer) feeding habits of **0+** largemouth bass **(n=22)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Psychomyiidae	0.1±0.4 (0.3)	1.2 (5.5)	4.6	2.5
EPHEMEROPTERA				
Baetidae	1.3±1.9 (5.0)	8.0 (36.9)	59.1	24.4
DIPTERA				
Chironomidae larvae	17.7±16.8 (66.4)	11.9 (54.8)	100.0	53.4
Chironomidae pupae	0.6±2.0 (2.2)	0.1 (0.5)	9.1	2.9
HEMIPTERA				
Corixidae	0.1±0.4 (0.3)	0.3 (1.4)	4.6	1.5
CLADOCERA				
Chydoridae	6.8±21.6 (25.6)	0.1 (0.5)	31.8	14.0
AMPHIPODA				
Talitridae	0.05±0.2 (0.2)	0.1 (0.5)	4.6	1.3

Table **F.1 1.** Seasonal (summer) feeding habits of **1+** largemouth bass **(n=44)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
EPHEMEROPTERA				
Baetidae	1.2±3.5 (2.9)	10.4 (7.5)	17.1	6.1
ODONATA				
Coenagriidae	2.5±7.5 (6.1)	67.8 (49.0)	41.5	21.5
COLEOPTERA				
Hydrophilidae	0.02±0.2 (0.06)	0.4 (0.3)	2.4	0.6
HYDRACARINA	0.02±0.2 (0.06)	0.05 (0.04)	2.4	0.6
DIPTERA				
Chironomidae larvae	1.9±5.1 (4.6)	24.4 (17.6)	48.8	15.8
Chironomidae pupae	1.0±4.1 (2.5)	5.0 (3.6)	17.1	5.2
Ceratopogonidae	0.7±2.2 (1.6)	2.4 (1.8)	22.0	5.6
COPEPODA				
Cyclopoida	1.3±5.8 (3.3)	0.1 (0.07)	9.8	2.9
Calanoida	0.7±4.4 (1.7)	0.05 (0.04)	4.9	1.5
CLADOCERA				
Daphnidae	8.7±39.4 (21.3)	1.0 (0.7)	4.9	6.0
Chydoridae	20.7±91.4 (50.7)	4.9 (3.5)	24.4	17.5
AMPHIPODA				
Talitridae	1.1±3.1 (2.7)	7.4 (5.3)	29.3	8.3
OSTRACODA	0.02±0.2 (0.06)	0.2 (0.1)	2.4	0.6
OSTEICHTHYES				
Unidentifiable	0.2±0.8 (0.5)	9.4 (6.8)	12.2	4.3
TERRESTRIAL INSECTS	0.9±3.0 (1.9)	5.1 (3.7)	9.8	3.4

Table **F.12.** Seasonal (summer) feeding habits of **2+** largemouth bass **(n=21) in** the **Pend Oreille** River.

	Number	**Weight**	Occurrence	**IRI**
	MEAN ± SD(%)	MEAN **(%)**	**%**	**%**
EPHEMEROPTERA				
Baetidae	6.9±14.9 (3.2)	30.4 (24.5)	42.9	15.5
Tricorythidae	0.05±0.2 (0.02)	1.6 (1.2)	4.8	1.3
ODONATA				
Coenagriidae	0.8±1.1 (0.4)	13.0 (10.4)	42.9	11.8
HYDRACARINA	0.05±0.2 (0.02)	0.05 (0.04)	4.8	1.1
DIPTERA				
Chironomidae larvae	0.6±0.9 (0.3)	0.05 (0.04)	38.1	8.5
Chironomidae pupae	3.6±13.7 (1.7)	1.4 (1.1)	19.1	4.8
Ceratopogonidae	0.05±0.2 (0.02)	0.05 (0.04)	4.8	1.1
HEMIPTERA				
Corixidae	0.1±0.6 (0.07)	0.05 (0.04)	4.8	1.1
COPEPODA				
Cyclopoida	0.9±3.9 (0.4)	0.05 (0.04)	9.5	2.2
CLADOCERA				
Chydoridae	197.8±901.7 (91.9)	7.2 (5.8)	28.6	27.8
AMPHIPODA				
Talitridae	1.7±3.6 (0.8)	2.2 (1.7)	38.1	8.9
OSTEICHTHYES				
Largemouth bass	0.3±1.1 (0.1)	9.4 (6.8)	9.5	3.6
OLIGOCHAETA				
Lumbriculidae	0.5±1.5 (0.2)	10.0 (8.0)	9.5	3.9
TERRESTRIAL INSECTS	2.1±4.8 (1 .0)	10.4 (8.4)	28.6	8.4

Table **F.13.** Seasonal (summer) feeding habits of **3+** largemouth bass **(n=44)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
EPHEMEROPTERA				
Baetidae	0.07±0.3 (0.6)	0.05 (0.004)	6.8	2.2
ODONATA				
Coenagrlidae	2.7±11.1 (23.9)	206.2 (5.9)	34.1	18.9
Aeshnidae	0.07±0.3 (0.6)	119.9 (3.4)	6.8	3.2
DIPTERA				
Chironomidae pupae	0.07±0.3 (0.6)	0.4 (0.01)	6.8	2.2
Ceratopogonidae	0.02±0.6 (0.2)	0.2 (0.004)	2.3	0.7
AMPHIPODA				
Talitridae	0.02±0.2 (0.2)	0.4 (0.01)	2.3	0.7
DECAPODA				
Pacifasticus	0.02±0.2 (0.2)	83.4 (2.4)	2.3	1.4
OSTEICHTHYES				
Unidentifiable	0.8±1.5 (6.9)	699.4 (19.9)	34.1	18.0
Pumpkinseed	0.02±0.2 (0.2)	1869.5 (53.2)	2.3	16.5
OLIGOCHAETA				
Naididae	0.05±0.3 (0.4)	1.6 (0.04)	2.3	0.8
TERRESTRIAL INSECTS	1.0±6.1 (8.9)	295.4 (8.4)	4.6	6.5
Formicidae	0.02±0.2 (0.2)	6.6 (0.2)	2.3	0.7
Coenagrlidae	5.0±9.3 (44.1)	215.2 (6.1)	29.6	23.6
Gerridae	0.3±1.3 (3.0)	18.6 (0.5)	11.4	4.4

Table **F.14.** Seasonal (summer) feeding habits of **4+** largemouth bass **(n=4)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
ODONATA				
Coenagrlidae	0.3±0.5 (2.0)	127.2 (98.0)	25.0	41.7
HEMIPTERA				
Corixidae	0.3±0.5 (2.0)	0.05 (0.0003)	25.0	9.0
TERRESTRIAL INSECTS	11.8±22.8 (95.9)	2.6 (2.0)	50.0	49.3

Table **F.15.** Seasonal (summer) feeding habits of **5+** largemouth bass **(n=4)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
ODONATA				
Coenagrlidae	0.3±0.6 (25.0)	0.1 (0.001)	33.3	17.5
OSTEICHTHYES				
Unidentifiable	0.7±0.6 (50.0)	1950.8 (77.1)	66.7	58.1
Pumpkinseed	0.3±0.6 (25.0)	580.2 (22.9)	33.3	24.4

Table F.16. Seasonal (summer) feeding habits of 6+ largemouth bass (n=3) in the Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
GASTROPODA				
Planorbidae	0.3±0.6 (25.0)	0.5 (0.02)	33.3	19.4
OSTEICHTHYES				
Unidentifiable	0.7±1.2 (50.1)	595.1 (23.0)	33.3	35.5
Pumpkinseed	0.3±0.6 (25.0)	1989.6 (77.0)	33.3	45.1

Table F.17. Seasonal (summer) feeding habits of 7+ largemouth bass (n=1) in the Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
OSTEICHTHYES				
Pumpkinseed	1 .0 (100.0)	4134.7 (100.0)	100.0	100.0

Table F.18. Seasonal (summer) feeding habits of 8+ largemouth bass (n=1) in the Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
OSTEICHTHYES				
Pumpkinseed	1.0 (100.0)	6088.1 (100.0)	100.0	100.0

Table F.19. Seasonal (summer) feeding habits of 10+ largemouth bass (n=1) in the Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
OSTEICHTHYES				
Yellow perch	1.0 (100.0)	8157.0 (100.0)	100.0	100.0

Table F.20. Seasonal (summer) feeding habits of 12+ largemouth bass (n=1) in the Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
OSTEICHTHYES				
Pumpkinseed	1 .0 (100.0)	6828.2 (100.0)	100.0	100.0

Table **F.21.** Seasonal (summer) feeding habits of **14+ largemouth** bass **(n=1)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
OSTEICHTHYES				
Yellow perch	1 .0 (100.0)	6718.9 (100.0)	100.0	100.0

Table **F.22.** Seasonal (fall) feeding habits of **0+** largemouth bass **(n=37)** in the **Pend Oreille** River

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
EPHEMEROPTERA				
Baetidae	4.8±6.2 (11.2)	24.0 (36.5)	70.3	22.4
ODONATA				
Coenagriidae	0.05±0.2 (0.1)	1.5 (2.3)	5.4	1.5
DIPTERA				
Chironomidae larvae	1.3±4.3 (3.1)	2.4 (3.7)	37.8	8.5
Chironomidae pupae	0.8±1.7 (1.8)	2.2 (3.4)	32.4	7.1
COPEPODA				
Cyclopoida	0.05±0.2 (0.1)	0.6 (1.0)	5.4	1.2
CLADOCERA				
Daphnidae	29.9±90.3 (69.6)	11.2 (17.2)	62.1	28.3
Chydoridae	3.2±6.2 (7.4)	2.6 (4.0)	56.8	12.9
AMPHIPODA				
Talitridae	1.4±4.1 (3.3)	3.2 (4.9)	27.0	6.7
OSTEICHTHYES				
Unidentifiable	0.1±0.3 (0.2)	13.6 (20.8)	10.8	6.0
TERRESTRIAL INSECTS	1.4±3.6 (3.1)	4.0 (6.1)	18.9	5.3

Table **F.23.** Seasonal (fall) feeding habits of **1+ largemouth** bass **(n=44)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
EPHEMEROPTERA				
Baetidae	5.9±9.2 (18.8)	45.1 (49.8)	77.3	28.0
ODONATA				
Coenagriidae	0.09±0.3 (0.3)	1.8 (2.0)	9.1	2.2
HYDRACARINA	0.02±0.2 (0.07)	0.05 (0.06)	2.3	0.5
DIPTERA				
Chironomidae larvae	1.2±2.8 (4.0)	1.4 (1.5)	38.6	8.5
Chironomidae pupae	0.3±1.2 (0.9)	6.5 (7.2)	11.4	3.7
HEMIPTERA				
Corixidae	0.02±0.2 (0.07)	1.2 (1.3)	2.3	0.7
COPEPODA				
Cyclopoida	1.4±8.7 (4.5)	1.5 (1.7)	9.1	2.9
CLADOCERA				
Daphnidae	15.5±50.9 (49.2)	7.6 (8.3)	61.4	22.8
Chydoridae	5.0±13.1 (15.9)	3.0 (3.4)	52.3	13.7
AMPHIPODA				
Talitridae	1.4±3.2 (4.6)	2.8 (3.1)	34.1	8.0
OSTEICHTHYES				
Unidentifiable	0.05±0.2 (0.1)	11.8 (13.0)	4.6	3.4
TERRESTRIAL INSECTS	0.4±1.4 (1.2)	5.8 (6.5)	11.4	3.7
Simuliidae	0.07±0.4 (0.2)	1.0 (1.1)	2.3	0.7
BIVALVIA				
Sphaeriidae	0.02±0.2 (0.07)	0.3 (0.3)	2.3	0.5
ARACHNIDA	0.02±0.2 (0.07)	0.8 (0.9)	2.3	0.6

Table **F.24.** Seasonal (fall) feeding habits of **2+ largemouth** bass **(n=55)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
EPHEMEROPTERA				
Baetidae	4.4±6.7 (5.7)	57.4 (34.6)	56.4	19.1
ODONATA				
Coenagriidae	0.1±0.5 (0.1)	2.8 (1.7)	7.3	1.8
HYDRACARINA	0.2±0.6 (0.3)	0.4 (0.2)	12.7	2.6
DIPTERA				
Chironomidae larvae	0.5±1.1 (0.7)	1.2 (0.7)	25.4	5.3
Chironomidae pupae	4.2±9.8 (5.4)	15.2 (9.2)	41.8	11.2
HEMIPTERA				
Corixidae	0.02±0.1 (0.02)	0.05 (0.03)	1.8	0.4
COPEPODA				
Cyclopoida	11.2±33.6 (14.5)	7.0 (4.2)	12.7	6.2
CLADOCERA				
Daphnidae	47.5±128.5 (61.7)	18.2 (10.9)	40.0	22.3
Chydoridae	1.3±2.8 (1.7)	3.2 (2.0)	36.4	7.9
Leptidoridae	0.04±0.3 (0.05)	1.5 (0.9)	1.8	0.5
AMPHIPODA				
Talitridae	1.5±5.0 (2.0)	6.6 (4.0)	27.3	6.6
OSTRACODA	0.04±0.3 (0.05)	1.4 (0.9)	1.8	0.5
OSTEICHTHYES				
Unidentifiable	0.07±0.3 (0.09)	18.4 (11.1)	7.3	3.7
Largemouth bass	0.05±0.3 (0.07)	1.6 (1.0)	3.6	0.9
ARACHNIDA	0.04±0.2 (0.05)	0.3 (0.3)	3.6	0.8
TERRESTRIAL INSECTS	5.8±27.8 (7.6)	30.5 (18.4)	25.4	10.2

Table **F.25.** Seasonal (fall) feeding habits of **3+** largemouth bass **(n=19)** in the **Pend Oreille River.**

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
EPHEMEROPTERA				
Baetidae	8.16±22.8 (57.2)	20.9 (6.0)	52.6	32.5
ODONATA				
Coenagriidae	0.05±0.2 (0.4)	1.6 (0.4)	5.3	1.7
DIPTERA				
Chironomidae larvae	0.3±1.2 (1.8)	1.2 (0.3)	5.3	2.1
Chironomidae pupae	2.8±12.2 (19.6)	4.8 (1.4)	5.3	7.4
HEMIPTERA				
Corixidae	0.4±1.2 (2.6)	2.2 (0.6)	15.8	5.3
CLADOCERA				
Daphnidae	0.3±1.2 (1.8)	0.5 (0.1)	5.3	2.0
Chydoridae	0.9±2.0 (6.3)	0.5 (0.1)	21.0	7.7
AMPHIPODA				
Talitridae	0.5±1 .0 (3.7)	1.6 (0.4)	6.0	2.8
OSTEICHTHYES				
Yellow perch	0.3±0.4 (1.8)	134.5 (38.3)	26.3	18.6
Largemouth bass	0.1±0.3 (0.7)	143.8 (40.9)	10.5	14.6
NEMATODA				
TERRESTRIAL INSECTS	0.6±1.4 (4.1)	40.0 (11.4)	3.0	5.2

Table **F.26.** Seasonal (fall) feeding habits of **4+** largemouth bass **(n=6)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
EPHEMEROPTERA				
Baetidae	16.3±31.4 (51.6)	21.7 (5.7)	50.0	29.2
DIPTERA				
Chironomidae larvae	14.0±34.3 (44.2)	14.6 (3.8)	16.7	17.6
CLADOCERA				
Chydoridae	0.3±0.5 (1.0)	0.2 (0.05)	33.3	9.4
AMPHIPODA				
Talitridae	0.5±1.2 (1.6)	0.3 (0.08)	16.7	5.0
OSTEICHTHYES				
Unidentifiable	0.5±0.6 (1.6)	345.1 (90.4)	50.0	38.7

Table **F.27.** Seasonal (fall) feeding habits of **5+** largemouth bass **(n=5)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
EPHEMEROPTERA				
Baetidae	16.2±21.8 (95.3)	20.2 (25.2)	60.0	56.4
CLADOCERA				
Chydoridae	0.2±0.4 (1.2)	0.4 (0.4)	20.0	6.8
OSTEICHTHYES				
Unidentifiable	0.6±0.9 (3.5)	59.6 (74.4)	40.0	36.8

Table **F.28.** Seasonal (fall) feeding habits of **6+ largemouth** bass **(n=3)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
EPHEMEROPTERA				
Baetidae	3.7±6.4 (78.5)	3.4 (0.08)	33.3	33.6
CLADOCERA				
Chydoridae	0.3±0.6 (7.1)	0.3 (0.01)	33.3	12.1
OSTEICHTHYES				
Yellow perch	0.7±0.6 (14.3)	4480.8 (99.9)	66.7	54.3

Table **F.29.** Seasonal (fall) feeding habits of **8+ largemouth** bass **(n=1)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
OSTEICHTHYES				
Yellow perch	1.0 (100.0)	8799.0 (100.0)	100.0	100.0

Table **F.30.** Seasonal (spring) feeding habits of **2+** yellow perch **(n=1)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
DIPTERA				
Chironomidae larvae	2.0 (66.7)	0.2 (66.7)	100.0	58.4
OSTRACODA	1.0 (33.3)	0.1 (33.3)	100.0	41.6

Table **F.31.** Seasonal (spring) feeding habits of **3+** yellow perch **(n=2)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
EPHEMEROPTERA				
Baetidae	4.5±6.4 (90.0)	3.4 (93.2)	50.0	77.7
DIPTERA				
Chironomidae larvae	0.5±0.7 (10.0)	0.3 (6.9)	50.0	22.3

Table **F.32.** Seasonal (spring) feeding habits of **4+** yellow perch **(n=14)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Limnephilidae	0.07±0.3 (0.3)	0.1 (0.9)	7.1	1.9
EPHEMEROPTERA				
Baetidae	5.4±13.4 (26.0)	6.2 (49.1)	64.3	32.5
ODONATA				
Coenagriidae	0.4±1.1 (2.1)	0.3 (2.0)	14.3	4.3
DIPTERA				
Chironomidae larvae	5.9±14.8 (28.1)	0.7 (5.8)	35.7	16.2
Chironomidae pupae	7.1±17.9 (33.9)	0.8 (6.6)	42.9	19.5
Ceratopogonidae	0.3±0.6 (1.4)	0.02 (0.2)	21.4	5.4
COPEPODA				
Cyclopoida	0.6±2.1 (2.7)	0.01 (0.06)	7.1	2.3
AMPHIPODA				
Talitridae	0.6±2.4 (3.1)	0.01 (0.06)	7.1	2.4
GASTROPODA				
Planorbidae	0.3±1.1 (1.4)	0.2 (1.8)	7.1	2.4
Lymnaeidae	0.07±0.3 (0.3)	4.3 (33.5)	7.1	9.5
Physidae	0.07±0.3 (0.3)	0.01 (0.06)	7.1	1.7
TERRESTRIAL INSECTS				
Machilidae	0.07±0.3 (0.3)	0.01 (0.06)	7.1	1.7

Table **F.33.** Seasonal (spring) feeding habits of **5+** yellow perch **(n=23)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN **(%)**	**%**	**%**
TRICHOPTERA				
Limnephilidae	0.3±0.9 (0.5)	1.6 (9.1)	8.7	4.3
Leptoceridae	0.2±0.8 (0.3)	0.02 (0.1)	4.4	1.1
EPHEMEROPTERA				
Baetidae	5.5±16.1 (10.4)	4.1 (23.2)	39.1	17.0
ODONATA				
Coenagriidae	0.3±1.3 (0.5)	0.1 (0.8)	4.4	1.3
Libellulidae	0.04±0.2 (0.08)	3.1 (17.4)	4.4	5.1
HYDRACARINA	0.04±0.2 (0.08)	0.02 (0.1)	4.4	1.1
DIPTERA				
Chironomidae larvae	6.7±10.5 (12.5)	0.3 (1.9)	47.8	14.6
Chironomidae pupae	24.9±70.0 (46.9)	1.7 (9.6)	43.5	23.4
COPEPODA				
Cyclopoida	8.6±40.0 (16.2)	0.06 (0.4)	8.7	5.9
CLADOCERA				
Daphnidae	4.5±21.7 (8.5)	0.03 (0.2)	4.4	3.1
MYSIDACEA				
Mysis	1.0±4.8 (1.9)	2.7 (15.6)	4.4	5.1
AMPHIPODA				
Talitridae	0.5±2.1 (1.0)	0.1 (0.8)	13.0	3.5
OSTRACODA	0.09±0.3 (0.2)	0.004 (0.03)	8.7	2.1
GASTROPODA				
Planorbidae	0.2±0.7 (0.3)	0.04 (0.2)	8.7	2.2
Lymnaeidae	0.09±0.3 (0.2)	0.2 (0.9)	8.7	2.3
OSTEICHTHYES				
Unidentifiable	0.09±0.3 (0.2)	1.1 (6.3)	4.4	2.6
OLIGOCHAETA				
Lumbriculidae	0.04±0.2 (0.08)	2.2 (12.8)	4.4	4.1
TERRESTRIAL INSECTS				
Cicadellidae	0.04±0.2 (0.08)	0.1 (0.6)	4.4	1.2

Table **F.34.** Seasonal (spring) feeding habits of **6+** yellow perch **(n=39)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	1.3±8.2 (5.5)	0.3 (1.3)	8.0	3.6
Limnephilidae	0.03±0.2 (0.1)	1.6 (6.0)	4.0	2.4
EPHEMEROPTERA				
Baetidae	4.0±11.6 (16.3)	8.8 (32.3)	64.0	27.0
Leptophlebiidae	0.03±0.2 (0.1)	0.2 (0.7)	0.02	0.2
ODONATA				
Coenagriidae	0.08±0.4 (0.3)	0.1 (0.5)	8.0	2.1
Aeshnidae	0.2±0.8 (0.9)	7.7 (28.2)	16.0	10.8
COLEOPTERA				
Elmidae larvae	0.08±0.5 (0.3)	0.004 (0.01)	4.0	1.0
HYDRACARINA	0.3±1.8 (1.3)	0.004 (0.01)	8.0	2.2
DIPTERA				
Chironomidae larvae	2.7±7.6 (11.3)	0.6 (2.0)	36.0	11.8
Chironomidae pupae	14.8±42.6 (61.2)	1.0 (3.7)	36.0	24.2
Tipulidae	0.03±0.2 (0.1)	0.06 (0.2)	4.0	1.0
Simuliidae	0.03±0.2 (0.1)	0.2 (0.7)	4.0	1.2
MYSIDACEA				
Mysis	0.03±0.2 (0.1)	0.2 (0.6)	4.0	1.1
OSTEICHTHYES				
Unidentifiable	0.03±0.2 (0.1)	1.6 (6.0)	4.0	2.6
OLIGOCHAETA				
Lumbriculidae	0.2±0.8 (0.7)	4.7 (17.2)	12.0	7.1
Naididae	0.4±2.2 (1.5)	0.2 (0.6)	4.0	1.5

Table **F.35.** Seasonal (spring) feeding habits of **7+** yellow perch **(n=2)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN± SD(%)	%	%
TRICHOPTERA				
Limnephilidae	2.5±3.5 (35.7)	6.6 (10.8)	50.0	16.1
EPHEMEROPTERA				
Baetidae	0.5±0.7 (7.1)	0.3 (0.4)	50.0	9.6
HYDRACARINA	0.5±0.7 (7.1)	0.05 (0.1)	50.0	9.5
DIPTERA				
Chironomidae larvae	1.5±0.7 (21.4)	0.1 (0.2)	100.0	20.3
Chironomidae pupae	1.5±0.7 (21.4)	0.5 (0.7)	100.0	20.4
OLIGOCHAETA				
Lumbriculidae	0.5±0.7 (7.1)	53.2 (87.8)	50.0	24.2

Table **F.36.** Seasonal (summer) feeding habits of **0+** yellow perch **(n=2)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
EPHEMEROPTERA				
Baetidae	0.5±0.7 (1.7)	0.1 (16.7)	50.0	12.4
ODONATA				
Coenagriidae	5.5±3.5 (18.3)	0.1 (16.7)	100.0	24.5
DIPTERA				
Chironomidae larvae	5.5±3.5 (18.3)	0.1 (16.7)	100.0	24.5
COPEPODA				
Cyclopoida	0.5±0.7 (1.7)	0.1 (16.7)	50.0	12.4
CLADOCERA				
Daphnidae	16.0±22.6 (53.3)	0.1 (16.7)	50.0	21.8
Chydoridae	2.0±1.4 (6.7)	0.1 (16.7)	100.0	4.2

Table **F.37.** Seasonal (summer) feeding habits of **1+** yellow perch **(n=6)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Leptoceridae	0.3±0.5 (0.8)	0.1 (1.3)	33.3	4.8
EPHEMEROPTERA				
Baetidae	1.3±2.4 (3.2)	0.3 (4.0)	33.3	5.5
ODONATA				
Coenagriidae	4.7±3.8 (11.1)	5.2 (69.2)	83.3	22.3
DIPTERA				
Chironomidae larvae	0.8±1.0 (2.0)	1.0 (13.3)	50.0	8.9
Chironomidae pupae	0.5±0.8 (1.2)	0.1 (1.3)	33.3	4.9
Ceratopogonidae	0.7±1.6 (1.6)	0.1 (1.3)	16.7	2.7
COPEPODA				
Cyclopoida	18.2±26.9 (43.1)	0.1 (1.3)	50.0	12.9
CLADOCERA				
Daphnidae	10.2±15.9 (24.1)	0.1 (1.3)	83.3	14.8
Chydoridae	4.5±2.6 (10.7)	0.1 (1.3)	100.0	15.3
AMPHIPODA				
Talitridae	1.0±1.6 (2.4)	0.4 (5.3)	50.0	7.9

Table **F.38.** Seasonal (summer) feeding habits of **2+** yellow perch **(n=5)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	13.2±28.4 (17.3)	0.8 (4.7)	60.0	9.5
Leptoceridae	1.2±2.2 (1.6)	0.8 (4.7)	40.0	5.4
EPHEMEROPTERA				
Baetidae	1.8±2.5 (2.4)	1.8 (10.2)	60.0	a.4
ODONATA				
Coenagriidae	3.2±4.2 (4.2)	11.5 (63.5)	60.0	14.8
HYDRACARINA	0.8±1.3 (1.0)	0.05 (0.3)	40.0	4.8
DIPTERA				
Chironomidae larvae	5.6±8.7 (7.3)	0.2 (0.8)	100.0	12.6
Chironomidae pupae	0.4±0.9 (0.5)	0.1 (0.6)	20.0	2.4
Ceratopogonidae larvae	0.4±0.9 (0.5)	0.05 (0.3)	20.0	2.4
Ceratopogonidae pupae	0.2±0.4 (0.3)	0.05 (0.3)	20.0	2.4
COPEPODA				
Cyclopoida	2.0±4.5 (2.6)	0.05 (0.3)	20.0	2.7
CLADOCERA				
Daphnidae	36.4±61.1 (47.6)	2.0 (11.3)	100.0	18.5
Chydoridae	7.6±13.9 (10.0)	0.2 (1.1)	40.0	5.9
AMPHIPODA				
Talitridae	3.2±4.9 (4.2)	0.2 (1.4)	40.0	5.3
OSTRACODA	0.2±0.4 (0.3)	0.05 (0.3)	20.0	2.4
GASTROPODA				
Planorbidae	0.2±0.4 (0.3)	0.05 (0.3)	20.0	2.4

Table **F.39.** Seasonal (summer) feeding habits of **3+** yellow perch **(n=36)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	9.6±20.2 (9.4)	5.7 (3.2)	58.3	8.2
Leptoceridae	1.8±4.5 (1.7)	6.8 (3.8)	25.0	3.5
EPHEMEROPTERA				
Baetidae	1.5±5.0 (1.4)	6.4 (3.6)	25.0	3.5
Tricorythidae	0.4±0.9 (0.4)	0.8 (0.4)	19.4	2.3
ODONATA				
Coenagriidae	0.8±1.7 (0.8)	19.8 (11.2)	30.6	4.9
COLEOPTERA				
Elmidae larvae	0.06±0.2 (0.05)	0.05 (0.03)	5.6	0.6
HYDRACARINA	0.9±1.7 (0.8)	0.3 (0.2)	33.3	4.0
DIPTERA				
Chironomidae larvae	7.8±9.9 (7.5)	10.4 (5.9)	86.1	11.5
Chironomidae pupae	1.2±3.7 (1.1)	50.2 (28.5)	38.9	7.9
Ceratopogonidae larvae	4.2±13.8 (4.1)	1.4 (0.8)	41.7	5.4
Ceratopogonidae pupae	0.03±0.2 (0.03)	0.05 (0.03)	2.8	0.3
Simuliidae larvae	1.5±8.5 (1.5)	2.8 (1.6)	5.6	1.0
Simuliidae pupae	0.2±0.7 (0.2)	0.1 (0.06)	8.3	1.0
COPEPODA				
Cyclopoida	1.9±4.0 (1.9)	0.1 (0.06)	44.4	5.4
CLADOCERA				
Daphnidae	63.5±192.6 (61.6)	2.4 (1.3)	75.0	15.9
Chydoridae	3.1±6.5 (3.0)	52.6 (29.8)	47.2	9.2
AMPHIPODA				
Talitridae	1.8±3.2 (1.7)	2.2 (1.2)	50.0	6.1
Gammaridae				
OSTRACODA	0.6±1.2 (0.5)	0.1 (0.06)	30.6	3.6
GASTROPODA				
Planorbidae	1.3±4.1 (1.3)	1.4 (0.8)	22.2	2.8
Lymnaeidae	0.6±2.1 (0.5)	0.1 (0.06)	8.3	1.0
Physidae	0.4±2.3 (0.4)	12.9 (7.3)	8.3	1.8

Table **F.40.** Seasonal (summer) feeding habits of **4+** yellow perch **(n=70)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	4.1±8.6 (6.4)	6.6 (2.0)	34.3	4.8
Leptoceridae	0.7±1.7 (1.1)	9.8 (2.9)	27.1	3.5
Brachycentridae	0.01±0.1 (0.02)	0.05 (0.01)	1.4	0.2
EPHEMEROPTERA				
Baetidae	0.8±2.7 (1.3)	10.2 (3.0)	25.7	3.4
Tricorythidae	0.2±0.6 (0.4)	1.2 (0.3)	14.3	1.7
ODONATA				
Coenagriidae	2.0±5.0 (3.0)	139.4 (41.1)	35.7	8.9
COLEOPTERA				
Elmidae larvae	0.06±0.4 (0.09)	0.05 (0.01)	2.9	0.3
Chrysomelidae				
HYDRACARINA	3.5±6.3 (5.4)	17.5 (5.2)	60.0	7.9
DIPTERA				
Chironomidae larvae	10.5±14.3 (16.2)	33.1 (9.8)	81.4	12.0
Chironomidae pupae	1.3±2.3 (2.0)	7.0 (2.1)	47.1	5.7
Ceratopogonidae larvae	2.0±6.0 (3.1)	4.6 (1.3)	52.9	6.4
Ceratopogonidae pupae	0.1±0.5 (0.2)	0.05 (0.01)	5.7	0.7
Simuliidae larvae	0.9±6.9 (1.3)	3.8 (1.1)	5.7	0.9
Simuliidae pupae	0.3±2.4 (0.5)	1.4 (0.4)	5.7	0.7
Sciomyzidae	0.01±0.1 (0.02)	0.05 (0.01)	1.4	0.2
COPEPODA				
Cyclopoida	4.6±12.2 (7.1)	0.2 (0.07)	52.9	6.7
CLADOCERA				
Daphnidae	22.2±37.6 (34.2)	23.9 (7.0)	70.0	12.4
Chydoridae	4.5±9.3 (6.9)	6.4 (1.9)	60.0	7.7
AMPHIPODA				
Talitridae	2.0±4.5 (3.1)	11.0 (3.2)	47.1	6.0
OSTRACODA	0.6±1.6 (0.9)	0.1 (0.03)	22.9	2.7
GASTROPODA				
Planorbidae	4.1±12.6 (6.3)	51.9 (15.3)	25.7	5.3
Lymnaeidae	0.1±0.8 (0.2)	2.3 (0.7)	5.7	0.7
Physidae	0.1±0.6 (0.2)	5.2 (1.5)	4.3	0.7
OSTEICHTHYES				
Unidentifiable	0.01±0.1 (0.02)	0.8 (0.2)	1.4	0.2
OLIGOCHAETA				
Lumbriculidae	0.1±0.8 (0.2)	2.8 (0.8)	1.4	0.3

Table **F.41.** Seasonal (summer) feeding habits of **5+** yellow perch **(n=88)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	5.3±14.5 (4.4)	9.6 (1.4)	35.2	4.4
Limnephilidae	0.01±0.1 (0.01)	0.2 (0.03)	1.1	0.1
Leptoceridae	1.4±3.7 (1.2)	22.0 (3.3)	26.1	3.3
EPHEMEROPTERA				
Baetidae	0.2±0.6 (0.2)	1.4 (0.2)	13.6	1.5
Ephemerellidae	0.09±0.5 (0.08)	4.4 (0.6)	3.4	0.4
Tricorythidae	0.8±3.1 (0.7)	13.1 (1.9)	17.1	2.1
PLECOPTERA				
Nemouridae	0.01±0.1 (0.01)	0.05 (0.01)	1.1	0.1
ODONATA				
Coenagriidae	2.0±4.3 (1.6)	153.1 (22.7)	37.5	6.7
COLEOPTERA				
Elmidae larvae	0.03±0.2 (0.03)	0.05 (0.01)	3.4	0.4
Elmidae adult	0.01±0.1 (0.01)	0.05 (0.01)	1.1	0.1
HYDRACARINA	6.2±10.6 (5.1)	36.2 (5.4)	60.2	7.7
DIPTERA				
Chironomidae larvae	8.4±17.1 (7.0)	26.6 (4.0)	81.8	10.1
Chironomidae pupae	1.2±2.4 (1.0)	4.5 (0.7)	42.0	4.7
Ceratopogonidae larvae	5.2±22.5 (4.4)	11.9 (1.8)	48.9	6.0
Ceratopogonidae pupae	0.2±1.2 (0.2)	0.4 (0.07)	6.8	0.8
Simuliidae larvae	0.1±0.5 (0.09)	0.1 (0.01)	5.7	0.6
Simuliidae pupae	0.05±0.3 (0.04)	0.8 (0.1)	3.4	0.4
HEMIPTERA				
Corixidae	0.03±0.3 (0.03)	1.9 (0.3)	1.1	0.2
COPEPODA				
Cyclopoida	2.0±4.3 (1.7)	0.8 (0.1)	35.2	37.0
CLADOCERA				
Daphnidae	64.9±224.9 (54.1)	64.5 (9.6)	68.2	14.3
Chydoridae	5.0±9.6 (4.2)	6.8 (1.0)	67.0	7.8
Bosminidae	0.01±0.1 (0.01)	0.05 (0.01)	1.1	0.1
AMPHIPODA				
Talitridae	4.0±8.5 (3.3)	34.4 (5.1)	55.7	7.0
OSTRACODA	1.5±6.2 (1.3)	0.2 (0.02)	31.8	3.6
GASTROPODA				
Planorbidae	10.5±32.4 (8.8)	214.0 (31.8)	46.6	9.5
Lymnaeidae	0.3±1.0 (0.3)	19.6 (2.9)	13.6	1.8
Physidae	0.3±1.1 (0.3)	29.5 (4.4)	10.2	1.6
OLIGOCHAETA				
Naididae	0.2±1.5 (0.1)	14.0 (2.1)	1.1	0.4
TERRESTRIAL INSECTS	0.01±0.1 (0.01)	0.4 (0.07)	1.1	0.1
BIVALVIA				
Sphaeriidae	0.01±0.1 (0.01)	3.0 (0.4)	1.1	0.2

Table **F.42.** Seasonal (summer) feeding habits of **6+** yellow perch **(n=57)** in the **Pend Oreille** River.

	Number	Wlsight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%	%	%
TRICHOPTERA				
Hydroptilidae	2.7±9.4 (4.0)	0.05 (0.01)	22.8	3.5
Leptoceridae	1.6±4.2 (2.4)	5.7 (1.2)	31.6	4.6
EPHEMEROPTERA				
ODONATA				
Coenagriidae	1.8±3.6 (2.6)	66.5 (13.4)	42.1	7.6
HYDRACARINA	5.4±10.4 (7.9)	12.2 (2.5)	52.6	8.3
DIPTERA				
Chironomidae larvae	6.9±11.1 (10.1)	11.4 (2.3)	66.7	10.4
Chironomidae pupae	0.8±1.6 (1.2)	9.6 (1.9)	35.1	5.0
Ceratopogonidae larvae	1.1±1.8 (1.6)	2.8 (0.6)	40.4	5.6
Ceratopogonidae pupae	0.02±0.1 (0.03)	0.05 (0.01)	1.a	0.2
Simuliidae larvae	0.2±1.1 (0.3)	1.0 (0.2)	5.3	0.8
Simuliidae pupae	0.05±0.3 (0.08)	14.7 (3.0)	3.5	0.9
HEMIPTERA				
Corixidae	2.0±11.6 (2.9)	24.6 (5.0)	3.5	1.5
COPEPODA				
Cyclopoida	0.6±1.7 (0.9)	8.0 (1.6)	19.3	2.9
Calanoida	0.07±0.5 (0.1)	[illegible]	1.8	[illegible]
CLADOCERA				
Daphnidae	22.8±86.5 (33.6)	24.4 (4.9)	38.6	10.1
Chydoridae	5.6±10.9 (8.2)	4.6 (0.9)	49.1	7.6
AMPHIPODA				
Talitridae	1.6±2.7 (2.3)	6.6 (1.3)	50.9	7.2
OSTRACODA	0.4±1.6 (0.6)	0.1 (0.02)	12.3	1.7
GASTROPODA				
Planorbidae	12.6±31.6 (18.5)	173.4 (35.0)	43.9	12.8
Lymnaeidae	0.9±2.9 (1.3)	90.0 (18.1)	21.0	5.3
Physidae	0.2±0.8 (0.3)	8.5 (1.7)	10.5	1.6
OSTEICHTHYES				
Unidentifiable	0.02±0.1 (0.03)	1.0 (0.2)	1.8	0.3
OLIGOCHAETA				
Lumbriculidae	0.5±4.0 (0.8)	30.8 (6.2)	1.8	1.2
Naididae	0.04±0.2 (0.05)	0.05 (0.01)	3.5	0.5
NEMATODA	0.02±0.1 (0.03)	0.05 (0.01)	1.8	0.2

Table **F.43.** Seasonal (summer) feeding habits of **7+** yellow perch **(n=1)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
DECAPODA				
Astacidae	1.0 (100.0)	645.5 (100.0)	100.0	100.0

Table **F.44.** Seasonal (fall) feeding habits of **0+** yellow perch **(n=17)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	0.06±0.2 (0.1)	0.8 (2.6)	5.9	1.4
EPHEMEROPTERA				
Baetidae	6.1±8.7 (12.2)	12.0 (37.3)	70.6	19.4
ODONATA				
Coenagrlidae	2.5±5.1 (4.9)	4.8 (14.8)	35.3	8.9
DIPTERA				
Chironomidae larvae	3.4±5.8 (6.7)	2.8 (8.6)	52.9	11.0
Chironomidae pupae	0.4±0.6 (0.7)	1.4 (4.5)	29.4	5.6
COPEPODA				
Cyclopoida	5.7±10.2 (11.4)	1.8 (5.5)	47.1	10.4
CLADOCERA				
Daphnidae	23.6±59.9 (47.1)	2.3 (7.2)	52.9	17.4
Chydoridae	3.6±8.1 (7.2)	1.6 (4.8)	41.2	8.6
AMPHIPODA				
Talitridae	1.4±2.7 (2.7)	2.2 (7.0)	47.1	9.2
OSTRACODA	3.5±12.5 (6.9)	2.4 (7.6)	35.3	8.1

Table **F.45.** Seasonal (fall) feeding habits of **1+** yellow perch **(n=19)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	0.05±0.2 (0.1)	0.8 (2.4)	5.3	1.1
Leptoceridae	0.2±0.7 (0.6)	0.9 (2.9)	10.5	2.0
EPHEMEROPTERA				
Baetidae	4.1±4.5 (10.7)	10.8 (35.1)	73.7	17.5
ODONATA				
Coenagrlidae	2.4±3.9 (6.3)	5.0 (16.3)	57.9	11.8
HYDRACARINA	0.2±0.4 (0.4)	1.4 (4.7)	15.6	3.0
DIPTERA				
Chironomidae larvae	1.6±2.8 (4.3)	2.4 (7.6)	36.8	7.1
Chironomidae pupae	0.5±1.4 (1.2)	1.3 (4.2)	15.8	3.1
COPEPODA				
Cyclopoida	9.4±22.8 (24.4)	1.8 (6.0)	52.6	12.1
CLADOCERA				
Daphnidae	14.0±21.3 (36.4)	0.9 (2.9)	57.9	14.2
Chydoridae	2.8±3.0 (7.3)	2.3 (7.4)	73.7	12.9
AMPHIPODA				
Talitridae	1.7±1.9 (4.5)	2.7 (8.7)	63.2	11.2
OSTRACODA	1.4±5.0 (3.7)	0.5 (1.6)	21.0	3.8

Table **F.46.** Seasonal (fall) feeding habits of **2+** yellow perch **(n=5)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	0.8±1.1 (0.7)	1.6 (2.3)	40.0	5.1
EPHEMEROPTERA				
Baetidae	7.2±9.2 (6.4)	6.7 (9.6)	60.0	9.0
ODONATA				
Coenagriidae	1.8±3.5 (1.6)	4.5 (6.4)	40.0	5.7
HYDRACARINA	1.4±2.1 (1.2)	3.4 (4.9)	60.0	7.9
DIPTERA				
Chironomidae larvae	57.2±70.5 (50.6)	23.8 (34.0)	100.0	22.0
Chironomidae pupae	9.8±19.8 (8.7)	6.1 (8.7)	40.0	6.8
COPEPODA				
Cyclopoida	1.0±1.4 (0.9)	1.0 (1.4)	40.0	5.0
CLADOCERA				
Daphnidae	9.4±19.9 (8.3)	3.0 (4.3)	40.0	6.3
Chydoridae	5.6±4.6 (5.0)	2.6 (3.7)	100.0	12.9
Cerodaphnia	10.6±23.7 (9.4)	1.8 (2.6)	20.0	3.8
AMPHIPODA				
Talitridae	4.2±4.8 (3.7)	4.3 (6.1)	60.0	8.3
OSTRACODA	0.4±0.9 (0.4)	0.8 (1.1)	20.0	2.6
GASTROPODA				
Planorbidae	3.6±8.0 (3.2)	10.4 (14.9)	20.0	4.5

Table **F.47.** Seasonal (fall) feeding habits of **3+** yellow perch **(n=24)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	1.5±6.3 (1.9)	4.5 (4.1)	16.7	3.4
Limnephilidae	0.1±0.4 (0.2)	1.9 (1.7)	8.3	1.5
Leptoceridae	2.1±10.2 (2.7)	3.1 (2.8)	4.2	1.4
Phryganeidae	0.2±1.2 (0.3)	1.4 (1.3)	4.2	0.8
EPHEMEROPTERA				
Baetidae	5.5±15.8 (7.2)	23.4 (21.3)	45.8	11.0
ODONATA				
Coenagriidae	0.4±1.8 (0.5)	0.4 (0.3)	8.3	1.3
HYDRACARINA	1.2±2.6 (1.5)	2.0 (1.8)	25.0	4.2
DIPTERA				
Chironomidae larvae	30.0±55.0 (38.7)	34.0 (31.1)	66.7	20.2
Chironomidae pupae	3.9±8.8 (5.1)	6.9 (6.3)	33.3	6.6
Ceratopogonidae	0.04±0.2 (0.05)	0.05 (0.05)	4.2	0.6
COPEPODA				
Cyclopoida	2.1±6.2 (2.7)	0.6 (0.5)	33.3	5.4
Calanoida	0.2±0.8 (0.2)	0.4 (0.4)	4.2	0.7
CLADOCERA				
Daphnidae	9.6±23.9 (12.5)	4.5 (4.1)	54.2	10.5
Chydoridae	6.8±12.4 (8.8)	3.8 (3.5)	66.7	11.7
AMPHIPODA				
Talitridae	10.6±18.9 (13.7)	11.6 (10.6)	66.7	13.5
OSTRACODA	0.5±1.8 (0.6)	0.2 (0.1)	8.3	1.3
GASTROPODA				
Planorbidae	2.6±8.1 (3.3)	10.8 (9.9)	25.0	5.7

Table **F.48.** Seasonal (fall) feeding habits of **4+** yellow perch **(n=86)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	0.7±2.3 (0.6)	1.8 (0.4)	20.9	3.0
Leptoceridae	0.06±0.4 (0.05)	0.05 (0.01)	3.5	0.4
Brachycentridae	0.01±0.1 (0.01)	0.05 (0.01)	1.2	0.2
EPHEMEROPTERA				
Baetidae	4.0±7.8 (3.4)	73.6 (16.5)	50.0	9.8
ODONATA				
Coenagriidae	0.4±0.9 (0.3)	9.4 (2.1)	23.3	3.6
HYDRACARINA	0.7±2.4 (0.6)	1.7 (0.4)	20.9	3.0
DIPTERA				
Chironomidae larvae	18.7±39.0 (15.8)	88.0 (19.7)	70.9	14.9
Chironomidae pupae	4.0±15.0 (3.4)	11.4 (2.6)	38.4	6.2
Tipulidae	0.02±0.2 (0.02)	0.05 (0.01)	2.3	0.3
Chaoborus	0.01±0.1 (0.01)	0.05 (0.01)	1.2	0.2
Simuliidae larvae	0.7±4.5 (0.6)	4.4 (1.0)	3.5	0.7
Simuliidae pupae	0.05±0.3 (0.04)	0.05 (0.01)	2.3	0.3
COPEPODA				
Cyclopoida	1.2±3.3 (1.0)	0.6 (0.1)	25.6	3.7
Calanoida	0.6±5.6 (0.5)	0.05 (0.01)	1.2	0.2
CLADOCERA				
Daphnidae	48.8±155.9 (41.2)	45.6 (10.2)	57.0	15.1
Chydoridae	21.8±60.4 (18.4)	40.7 (9.1)	62.8	12.6
AMPHIPODA				
Talitridae	5.5±10.2 (4.7)	32.8 (7.3)	68.6	11.3
OSTRACODA	1.1±3.2 (0.9)	0.2 (0.04)	18.6	2.7
GASTROPODA				
Planorbidae	9.1±30.6 (7.7)	116.4 (26.0)	38.4	10.1
Lymnaeidae	0.03±0.2 (0.03)	6.6 (1.5)	3.5	0.7
Physidae	0.02±0.2 (0.02)	6.0 (1.3)	1.2	0.4
ARACHNIDA	0.01±0.1 (0.01)	0.3 (0.07)	1.2	0.2
BIVALVIA				
Sphaeriidae	0.5±4.8 (0.4)	0.05 (0.01)	1.2	0.2

Table **F.49.** Seasonal (fall) feeding habits of **5+** yellow perch **(n=76)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	1.8±5.9 (0.9)	6.4 (1.0)	27.6	4.3
Leptoceridae	0.1±0.7 (0.07)	0.05 (0.01)	5.3	0.8
Phryganeidae	0.3±1.5 (0.2)	29.6 (4.9)	6.6	1.7
Psychomidae	0.01±0.1 (0.01)	0.4 (0.06)	1.3	0.2
EPHEMEROPTERA				
Baetidae	6.5±13.4 (3.2)	103.3 (17.0)	55.3	11.1
ODONATA				
Coenagriidae	0.9±4.0 (0.4)	15.6 (2.6)	14.5	2.6
Libellulidae	0.01±0.1 (0.01)	6.0 (1.0)	1.3	0.3
ODONATA				
Macromiidae	0.01±0.1 (0.01)	0.05 (0.01)	1.3	0.2
DIPTERA				
Chironomidae larvae	7.3±14.1 (3.7)	9.7 (1.6)	63.2	10.0
Chironomidae pupae	3.9±12.4 (1.9)	25.8 (4.3)	32.9	5.7
Simuliidae larvae	0.3±2.3 (0.2)	9.8 (1.6)	2.6	0.6
Simuliidae pupae	0.07±0.5 (0.03)	1.3 (0.2)	2.6	0.4
HYDRACARINA	0.5±2.3 (0.3)	9.8 (1.6)	18.4	3.0
COPEPODA				
Cyclopoida	8.1±37.3 (4.1)	7.2 (1.2)	27.6	4.8
Calanoida	1.6±8.7 (0.8)	0.6 (0.09)	4.0	0.7
CLADOCERA				
Daphnidae	113.8±418.0 (57.2)	10.8 (1.8)	48.7	15.8
Chydoridae	13.4±31.8 (6.8)	61.4 (10.1)	55.3	10.6
Cerodaphnia	29.8±259.9 (15.0)	0.6 (0.1)	1.3	2.4
AMPHIPODA				
Talitridae	5.5±12.6 (2.8)	28.4 (4.7)	55.3	9.2
OSTRACODA	0.1±0.4 (0.04)	9.7 (1.6)	5.3	1.0
GASTROPODA				
Planorbidae	4.3±11.9 (2.2)	47.6 (7.8)	35.5	6.7
Lymnaeidae	0.3±1.5 (0.2)	159.6 (26.3)	7.9	5.0
Physidae	0.1±0.9 (0.07)	3.0 (0.5)	4.0	0.7
OSTEICHTHYES				
Unidentifiable	0.01±0.1 (0.01)	31.0 (5.1)	1.3	0.9
TERRESTRIAL INSECTS	0.04±0.3 (0.02)	29.8 (4.9)	2.6	1.1

Table **F.50.** Seasonal (fall) feeding habits of **6+** yellow perch **(n=43)** in the **Pend Oreille** River,

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	0.4±1.4 (0.8)	51.2 (7.6)	18.6	4.4
Limnephilidae	0.5±3.5 (1.0)	20.5 (3.1)	2.3	1.0
Phryganeidae	0.09±0.5 (0.2)	36.6 (5.5)	4.6	1.7
Hydropsychidae	0.1±0.5 (0.2)	4.6 (0.7)	4.6	0.9
EPHEMEROPTERA				
Baetidae	11.1±15.0 (20.0)	154.8 (23.1)	69.8	18.2
ODONATA				
Coenagriidae	1.6±4.4 (3.0)	28.4 (4.2)	32.6	6.4
HYDRACARINA	0.02±0.2 (0.04)	0.05 (0.01)	2.3	0.4
DIPTERA				
Chironomidae larvae	9.6±28.7 (17.2)	36.4 (5.4)	48.8	11.5
Chironomidae pupae	0.4±2.0 (0.8)	11.7 (1.8)	14.0	2.7
CLADOCERA				
Daphnidae	3.1±9.5 (5.6)	2.5 (0.4)	20.9	4.4
Chydoridae	16.9±38.8 (30.3)	15.4 (2.3)	48.8	13.2
AMPHIPODA				
Talitridae	5.0±8.3 (8.9)	23.0 (3.4)	74.4	14.0
OSTRACODA	0.07±0.3 (0.1)	0.05 (0.01)	4.6	0.8
GASTROPODA				
Planorbidae	5.8±17.2 (10.4)	101.2 (15.1)	44.2	11.3
Lymnaeidae	0.5±1.4 (1.0)	71.8 (10.7)	16.3	4.5
Physidae	0.1±0.5 (0.2)	21.4 (3.2)	4.6	1.3
OSTEICHTHYES				
Unidentifiable	0.02±0.2 (0.04)	29.6 (4.4)	2.3	1.1
Yellow perch	0.02±0.2 (0.04)	55.4 (8.3)	2.3	1.7
TERRESTRIAL INSECTS	0.1±0.9 (0.2)	5.1 (0.8)	2.3	0.5

Table F.51. Seasonal (spring) feeding habits of I+ mountain whitefish (n=6) in the Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	0.5±1.2 (0.1)	0.02 (0.04)	16.7	3.2
Brachycentridae	0.3±0.8 (0.9)	0.02 (0.04)	16.7	3.3
EPHEMEROPTERA				
Baetidae	13.0±31.8 (3.7)	15.7 (41.4)	16.7	11.6
COLEOPTERA				
Elmidae larvae	0.2±0.4 (0.05)	1.5 (4.0)	16.7	3.9
HYDRACARINA	0.7±1.2 (0.2)	0.05 (0.1)	33.3	6.3
DIPTERA				
Chironomidae larvae	311.7±367.4 (88.2)	19.2 (50.8)	100.0	44.7
Chironomidae pupae	26.3±51.8 (7.5)	1.0 (2.7)	66.7	14.4
AMPHIPODA				
Talitridae	0.5±0.6 (0.1)	0.03 (0.1)	50.0	9.4
BIVALVIA				
Sphaeriidae	0.2±0.4 (0.05)	0.3 (0.8)	16.7	3.3

Table F.52. Seasonal (spring) feeding habits of 2+ mountain whitefish (n=37) in the Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	1.2±2.2 (0.3)	0.03 (0.08)	46.0	7.7
Limnephilidae	0.4±1.5 (0.1)	0.7 (1.9)	16.2	3.0
Leptoceridae	1.5±6.1 (0.4)	1.5 (4.0)	10.8	2.5
EPHEMEROPTERA				
Baetidae	1.2±3.0 (0.3)	0.3 (0.8)	27.0	4.6
ODONATA				
Coenagriidae	1.0±2.6 (0.3)	0.3 (0.8)	18.9	3.3
COLEOPTERA				
Elmidae larvae	0.05±0.3 (0.02)	0.004 (0.01)	2.7	0.5
HYDRACARINA	0.2±0.4 (0.05)	0.004 (0.01)	16.2	2.7
DIPTERA				
Chironomidae larvae	311.9±288.8 (90.0)	31.1 (83.6)	100.0	45.2
Chironomidae pupae	26.0±81.1 (7.5)	2.1 (5.6)	62.2	12.4
Ceratopogonidae	0.03±0.2 (0.01)	0.02 (0.05)	2.7	0.5
Simuliidae larvae	0.2±0.6 (0.1)	0.1 (0.3)	16.2	2.7
COPEPODA				
Cyclopoida	0.2±0.7 (0.05)	0.02 (0.05)	8.1	1.4
CLADOCERA				
Daphnidae	0.05±0.3 (0.02)	0.004 (0.01)	2.7	0.5
Chydoridae	0.03±0.2 (0.01)	0.004 (0.01)	2.7	0.4
AMPHIPODA				
Talitridae	1.8±6.1 (0.5)	0.06 (0.2)	37.8	6.4
Gammaridae	0.1±0.5 (0.03)	0.02 (0.05)	5.4	0.9
OSTRACODA	0.5±1.4 (0.2)	0.05 (0.1)	18.9	3.2
GASTROPODA				
Planorbidae	0.05±0.2 (0.02)	0.004 (0.01)	5.4	0.9
Lymnaeidae	0.05±0.3 (0.02)	0.3 (0.8)	2.7	0.5
OLIGOCHAETA				
Lumbriculidae	0.03±0.2 (0.01)	0.7 (1.9)	2.7	0.7

Table F.53. Seasonal (spring) feeding habits of 3+ mountain whitefish (n=73) in the Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	1.3±2.6 (0.4)	0.2 (0.2)	50.7	7.5
Limnephilidae	1.0±3.9 (0.3)	3.3 (2.8)	11.0	2.1
Leptoceridae	1.0±3.1 (0.3)	2.1 (1.8)	19.2	3.1
Phryganeidae	0.1±0.4 (0.02)	1.5 (1.3)	5.5	1.0
Hydropsychidae	0.3±2.8 (0.1)	0.7 (0.6)	1.4	0.3
Glossosomatidae	0.3±2.1 (0.1)	0.1 (0.1)	1.4	0.2
Brachycentridae	1.1±4.6 (0.3)	0.04 (0.03)	17.8	2.7
EPHEMEROPTERA				
Baetidae	1.7±4.8 (0.5)	2.3 (1.9)	37.0	5.7
Ephemerellidae	0.01±0.1 (0.004)	0.004 (0.004)	1.4	0.2
Heptageniidae	0.1±1.2 (0.04)	0.2 (0.1)	1.4	0.2
PLECOPTERA				
Nemouridae	0.03±0.2 (0.01)	0.01 (0.004)	1.4	0.2
ODONATA				
Coenagriidae	1.6±4.0 (0.5)	2.2 (1.8)	31.5	4.9
COLEOPTERA				
Elmidae larvae	12.5±76.5 (3.7)	2.8 (2.3)	12.3	2.7
Chrysomelidae				
HYDRACARINA	0.8±2.8 (0.2)	0.3 (0.2)	28.8	4.2
DIPTERA				
Chironomidae larvae	294.3±262.5 (87.3)	75.4 (63.5)	98.6	36.3
Chironomidae pupae	10.4±35.7 (3.1)	2.4 (2.0)	35.6	5.9
Tipulidae	0.03±0.2 (0.01)	0.02 (0.02)	1.4	0.2
Bibionidae	0.4±3.3 (0.1)	1.2 (1.0)	1.4	0.4
Ceratopogonidae	0.01±0.1 (0.004)	0.1 (0.1)	1.4	0.2
Muscidae	0.03±0.2 (0.01)	0.04 (0.03)	1.4	0.2
Simuliidae larvae	5.2±25.2 (1.6)	1.1 (0.9)	21.9	3.5
Simuliidae pupae	0.03±0.2 (0.01)	4.9 (4.1)	1.4	0.8
MEGALOPTERA				
Sialidae	0.01±0.1 (0.004)	0.2 (0.2)	1.4	0.2
COPEPODA				
Cyclopoida	0.05±0.2 (0.02)	0.1 (0.1)	5.5	0.8
CLADOCERA				
Daphnidae	0.2±0.9 (0.1)	0.004(0.004)	11.0	1.6
MYCIDAE				
Mysis	0.2±0.7 (0.04)	0.3(0.2)	6.9	1.0
AMPHIPODA				
Talitridae	3.6±7.7 (1.1)	0.6 (0.5)	52.1	7.8
Gammaridae	0.2±0.8 (0.1)	0.1 (0.1)	6.9	1.0
OSTRACODA	0.1±0.5 (0.03)	0.03 (0.03)	4.1	0.6
GASTROPODA				
Planorbidae	0.1±0.3 (0.02)	0.1 (0.1)	5.5	0.8
OLIGOCHAETA				
Lumbriculidae	0.3±1.5 (0.1	16.3 (13.7)	5.5	2.8
NEMATODA	0.01±0.1 (0.004)	0.1 (0.04)	1.4	0.2
BIVALVIA				
Sphaeriidae	0.2±1.3 (0.1)	0.5 (0.4)	2.7	0.5

Table F.54. Seasonal (spring) feeding habits of 4+ mountain whitefish (n=60) in the Pend Oreille River.

	Number	Weight	Occurrence	RI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	2.9±11.8 (0.8)	0.1 (0.1)	38.3	6.0
Limnephilidae	2.6±6.1 (0.8)	7.5 (6.1)	26.7	5.1
Leptoceridae	2.6±8.3 (0.8)	1.9 (1.5)	36.7	5.9
Phryganeidae	0.1±0.4 (0.03)	0.6 (0.5)	5.0	0.8
Hydropsychidae	0.02±0.1 (0.004)	0.04 (0.03)	1.7	0.3
Brachycentridae	0.1±0.3 (0.03)	0.004 (0.004)	10.0	1.5
EPHEMEROPTERA				
Baetidae	6.0±16.6 (1.8)	6.3 (5.1)	36.7	6.6
PLECOPTERA				
Nemouridae	0.02±0.1 (0.004)	0.0[illegible] (0.02)	1.7	0.3
Perlodidae	0.03±0.2 (0.01)	0.03 (0.03)	3.3	0.5
ODONATA				
Coenagriidae	4.1±17.1 (1.2)	5.5 (4.5)	35.0	6.2
Libellulidae	0.02±0.1 (0.004)	0.004 (0.004)	1.7	0.3
COLEOPTERA				
Elmidae larvae	6.8±51.0 (2.0)	2.4 (2.0)	11.7	2.4
HYDRACARINA	0.3±1.0 (0.1)	0.05 (0.04)	15.0	2.3
DIPTERA				
Chironomidae larvae	299.8±324.4 (86.9)	51.7 (41.9))	98.3	34.5
Chironomidae pupae	4.7±18.9 (1.4)	9.5 (7.7)	30.0	5.9
Ceratopogonidae	0.1±0.6 (0.04)	0.03 (0.03)	5.0	0.8
Simuliidae larvae	0.5±2.1 (0.1)	0.1 (0.1)	8.3	1.3
COPEPODA				
Cyclopoida	0.07±0.4 (0.02)	0.02 (0.02)	3.3	0.5
CLADOCERA				
Daphnidae	0.1±0.4 (0.02)	0.2 (0.2)	5.0	0.8
MYSIDACEA				
Mysis	0.1±0.7 (0.04)	0.4 (0.3)	5.0	0.8
AMPHIPODA				
Talitridae	2.3±4.6 (0.7)	0.3 (0.3)	41.7	6.5
Gammaridae	0.2±0.7 (0.1)	0.01 (0.01)	6.7	1.0
OSTRACODA	0.5±2.9 (0.2)	0.02 (0.02)	6.7	1.1
GASTROPODA				
Planorbidae	0.2±0.7 (0.1)	0.2 (0.2)	13.3	2.1
Lymnaeidae	0.07±0.4 (0.02)	0.2 (0.1)	3.3	0.5
OLIGOCHAETA				
Lumbriculidae	1.6±8.1 (0.5)	35.1 (28.4)	6.7	5.4
Naididae	9.1±70.6 (2.6)	0.9 (0.7)	1.7	0.8

Table **F.55** Seasonal (spring) feeding habits of **5+** mountain whitefish **(n=3)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	1.7±2.9 (0.3)	0.03 (0.01)	33.3	3.2
Leptoceridae	6.0±7.9 (1.1)	9.6 (4.3)	66.7	7.0
EPHEMEROPTERA				
Baetidae	3.3±4.9 (0.6)	1.7 (0.7)	66.7	6.6
ODONATA				
Coenagriidae	1.7±2.1 (0.3)	0.1 (0.06)	66.7	6.5
COLEOPTERA				
Elmidae larvae	4.3±7.5 (0.8)	1.4 (0.6)	33.3	3.4
HYDRACARINA	1.7±2.9 (0.3)	0.3 (0.1)	33.3	3.3
DIPTERA				
Chironomidae larvae	488.7±358.8 (92.0)	163.9 (73.1)	100.0	25.7
Chironomidae pupae	5.33±9.24 (1.0)	1.1 (0.5)	33.3	3.4
MEGALOPTERA				
Sialidae	0.3±0.6 (0.06)	3.3 (1.5)	33.3	3.4
COPEPODA				
Cyclopoida	1.0±1.7 (0.2)	0.03 (0.01)	33.3	3.2
CLADOCERA				
Daphnidae	1.0±1.0 (0.2)	0.2 (0.1)	66.7	6.5
MYSIDACEA				
Mysis	0.3±0.6 (0.06)	0.7 (0.3)	33.3	3.3
AMPHIPODA				
Talitridae	10.0±8.2 (1.9)	2.1 (0.9)	100.0	9.9
GASTROPODA				
Planorbidae	2.0±3.5 (0.4)	2.6 (1.2)	33.3	3.4
Lymnaeidae	0.3±0.6 (0.06)	3.2 (1.4)	33.3	3.4
OLIGOCHAETA				
Lumbriculidae	0.3±0.6 (0.06)	31.0 (13.8)	33.3	4.7
BIVALVIA				
Sphaeriidae	3.0±3.6 (0.6)	3.0 (1.3)	33.3	3.4

Table **F.56.** Seasonal (summer) feeding habits of **0+** mountain whitefish **(n=3)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	4.0±4.0 (9.8)	1.5 (11.3)	33.3	12.6
DIPTERA				
Chironomidae larvae	32.3±35.4 (79.5)	5.8 (43.6)	100.0	51.5
Chironomidae pupae	3.7±6.4 (9.0)	1.4 (10.5)	33.3	12.2
Simuliidae pupae larvae	0.3±0.6 ((0.8	1.5 (11.3) 3.1 (23.3)	33.3 33.3	10.5 13.2

Table **F.57.** Seasonal (summer) feeding habits of **1+** mountain whitefish **(n=10)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	0.1±0.3 (0.08)	0.03 (0.1)	10.0	1.7
Glossosomatidae	5.2±15.4 (4.3)	0.03 (0.1)	20.0	4.0
EPHEMEROPTERA				
Baetidae	0.1±0.3 (0.08)	0.03 (0.1)	10.0	1.7
ODONATA				
Coenagriidae	0.2±0.4 (0.2)	2.3 (5.9)	20.0	4.3
HYDRACARINA	0.8±1.0 (0.7)	0.5 (1.3)	50.0	8.5
DIPTERA				
Chironomidae larvae	78.4±108.7 (64.6)	26.0 (66.8)	90.0	36.3
Chironomidae pupae	5.6±9.6 (4.6)	3.5 (9.0)	80.0	15.3
Ceratopogonidae	1.7±4.7 (1.4)	0.2 (0.5)	20.0	3.6
Simuliidae larvae	23.1±72.0 (19.0)	1.9 (4.8)	40.0	10.4
Simuliidae pupae	0.5±1.6 (0.4)	0.4 (1.0)	10.0	1.9
CLADOCERA				
Chydoridae	5.0±1 5.8 (4.1)	1.2 (3.1)	10.0	2.8
AMPHIPODA				
Talitridae	0.1±0.3 (0.08)	0.03 (0.08)	10.0	1.7
GASTROPODA				
Planorbidae	0.4±1.0 (0.3)	2.1 (5.3)	20.0	4.2
Lymnaeidae	0.2±0.4 (0.2)	0.7 (1.9)	20.0	3.6

Table **F.58.** Seasonal (summer) feeding habits of **2+** mountain whitefish **(n=8)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Leptoceridae	2.6±7.4 (3.0)	12.4 (27.8)	12.5	9.9
HYDRACARINA	0.2±0.5 (0.3)	1.0 (2.1)	25.0	6.3
DIPTERA				
Chironomidae larvae	60.9±171.4 (69.4)	15.8 (35.5)	25.0	29.7
Chironomidae pupae	1.2±1 .9 (1.4)	1.4 (3.1)	37.5	9.6
Simuliidae larvae	1.2±2.1 (1.4)	2.2 (5.0)	50.0	12.9
Simuliidae pupae	1.8±5.0 (2.0)	2.4 (5.5)	12.5	4.6
CLADOCERA				
Chydoridae	16.9±47.3 (19.2)	0.6 (1.2)	25.0	10.4
GASTROPODA				
Planorbidae	0.2±0.7 (0.3)	0.8 (1.7)	12.5	3.3
Lymnaeidae	2.2±6.4 (2.6)	3.6 (8.0)	12.5	5.5
TERRESTRIAL INSECTS				
Aphididae	0.1±0.4 (0.1)	3.6 (8.0)	12.5	4.7
BIVALVIA				
Sphaeriidae	0.2±0.7 (0.3)	0.9 (2.0)	12.5	3.4

Table **F.59.** Seasonal (summer) feeding habits of **3+** mountain whitefish **(n=19)** in the **Pend Oreille** River.

	Number	Wei ht	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	0.4±1.6 (0.9)	0.1 (0.05)	5.3	1.3
Leptoceridae	3.4±8.7 (8.6)	45.6 (24.1)	31.6	13.1
Brachycentridae	0.7±3.0(1.8)	1.8 (1.0)	10.5	2.7
EPHEMEROPTERA				
Baetidae	0.05±0.2 (0.1)	1.2 (0.7)	5.3	1.2
ODONATA				
Coenagriidae	0.1±0.3 (0.3)	4.8 (2.5)	10.5	2.7
HYDRACARINA	2.2±7.0 (5.4)	4.5 (2.4)	42.1	10.2
DIPTERA				
Chironomidae larvae	13.3±25.7 (33.0)	9.6 (5.0)	79.0	23.9
Chironomidae pupae	1.8±3.0 (4.6)	2.3 (1.2)	36.8	8.7
Simuliidae larvae	16.3±45.3 (40.6)	107.4 (56.8)	31.6	26.3
Simuliidae pupae	1.8±3.7 (4.5)	9.2 (4.9)	26.3	7.3
AMPHIPODA				
Talitridae	0.05±0.2 (0.1)	0.4 (0.2)	5.3	1.1
GASTROPODA				
Planorbidae	0.05±0.2 (0.1)	2.2 (1.2)	5.3	1.3

Table **F.60.** Seasonal **(summer)feeding** habits of **4+** mountain whitefish **(n=3)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Leptoceridae	2.3±3.2 (5.4)	4.5 (61.2)	66.7	25.0
HYDRACARINA	2.3±4.0 (5.4)	0.9 (11.7)	33.3	9.4
DIPTERA				
Chironomidae larvae	2.3±2.1 (5.4)	0.2 (2.7)	66.7	14.0
Chironomidae pupae	3.0±4.4 (6.9)	0.05 (0.7)	66.7	13.9
Simuliidae larvae	33.0±56.3 (76.2)	0.6 (8.2)	66.7	28.3
OLIGOCHAETA				
Naididae	0.3±0.6 (0.8)	1.2 (15.6)	33.3	9.3

Table **F.61.** Seasonal (fall) feeding habits of **0+** mountain whitefish **(n=1)** in the **Pend Oreille River.**

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	14.0±0.0 (51.5)	2.0 (87.0)	100.0	47.7
DIPTERA				
Chironomidae larvae	7.0±0.0 (25.9)	0.1 (4.4)	100.0	26.1
CLADOCERA				
Chydoridae	6.0±0.0 (22.2)	0.2 (8.7)	100.0	26.2

Table **F.62.** Seasonal (fall) feeding **habits** of **1+** mountain whitefish **(n=3)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	14.3±14.5 (13.9)	9.4 (31.2)	66.7	19.7
HYDRACARINA	0.7±1.2 (0.6)	0.1 (0.3)	33.3	6.0
DIPTERA				
Chironomidae larvae	75.7±106.2 (73.2)	14.3 (47.5)	100.0	39.0
CLADOCERA				
Chydoridae	10.3±8.5 (10.0)	1.2 (4.0)	100.0	20.1
AMPHIPODA				
Talitridae	1.7±2.9 (1.6)	0.1 (0.3)	33.3	6.2
GASTROPODA				
Lymnaeidae	0.7±1.2 (0.6)	5.0 (16.6)	33.3	8.9

Table **F.63.** Seasonal (fall) feeding habits of **2+** mountain whitefish **(n=5)** in the **Pend Oreille River.**

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	11.6±20.8 (13.5)	3.0 (2.1)	40.0	10.3
EPHEMEROPTERA				
Baetidae	0.2±0.4 (0.2)	0.3 (0.2)	20.0	3.8
DIPTERA				
Chironomidae larvae	68.2±125.8 (79.3)	102 (70.4)	100.0	46.2
Chironomidae pupae	0.4±0.6 (0.5)	1.0 (0.7)	40.0	7.6
CLADOCERA				
Chydoridae	3.4±7.1 (4.0)	0.5 (0.4)	40.0	8.2
AMPHIPODA				
Talitridae	0.4±0.9 (0.5)	0.1 (0.07)	20.0	3.8
GASTROPODA				
Planorbidae	0.6±1.3 (0.7)	8.8 (6.1)	20.0	5.0
Lymnaeidae	0.2±0.4 (0.2)	3.8 (2.6)	20.0	4.2
TERRESTRIAL INSECTS	0.8±1.8 (0.9)	22.6 (15.6)	20.0	6.8
BIVALVIA				
Sphaeriidae	0.2±0.4 (0.2)	2.8 (1.9)	20.0	4.1

Table **F.64.** Seasonal (fall) feeding habits of **3+** mountain whitefish **(n=27)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	15.3±44.1 (9.3)	25.1 (4.3)	25.9	7.7
Leptoceridae	8.3±42.1 (5.1)	29.8 (5.1)	7.4	3.4
Psychomyiidae	0.04±0.2 (0.02)	0.05 (0.01)	3.7	0.7
HYDRACARINA	0.2±0.4 (0.09)	0.2 (0.04)	14.8	2.9
DIPTERA				
Chironomidae larvae	122.6±115.8 (74.8)	439.6 (74.9)	92.6	47.1
Chironomidae pupae	5.6±11.5 (3.4)	21.4 (3.6)	33.3	7.8
Simuliidae larvae	3.0±13.2 (1.8)	11.0 (1.9)	11.1	2.9
Simuliidae pupae	1.3±4.8 (0.8)	5.5 (0.9)	11.1	2.5
CLADOCERA				
Daphnidae	3.3±16.4 (2.0)	0.2 (0.03)	7.4	1.8
Chydoridae	0.4±1.4 (0.2)	0.8 (0.1)	11.1	2.2
AMPHIPODA				
Talitridae	1.4±2.2 (0.8)	3.4 (0.6)	55.6	11.1
GASTROPODA				
Planorbidae	0.7±3.5 (0.4)	22.0 (3.8)	3.7	1.5
Lymnaeidae	0.3±1.1 (0.2)	23.1 (3.9)	7.4	2.2
TERRESTRIAL INSECTS	1.7±3.9 (1.0)	3.5 (0.6)	29.6	6.1

Table **F.65.** Seasonal (fall) feeding habits of **4+** mountain whitefish **(n=18)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	51.9±103.5 (19.3)	123.8 (13.3)	33.3	12.2
Leptoceridae	2.4±10.1 (0.9)	2.0 (0.2)	5.6	1.2
EPHEMEROPTERA				
Baetidae	0.2±0.4 (0.06)	1.6 (0.2)	16.7	3.1
ODONATA				
Coenagrlidae	0.2±0.4 (0.06)	0.8 (0.09)	16.7	3.1
HYDRACARINA	18.4±75.5 (6.8)	3.7 (0.4)	44.4	9.6
DIPTERA				
Chironomidae larvae	189.7±207.4 (70.4)	529.3 (56.8)	94.4	41.1
Chironomidae pupae	1.3±4.2 (0.5)	3.8 (0.4)	22.2	4.3
CLADOCERA				
Chydoridae	1.8±5.8 (0.7)	0.9 (0.1)	33.3	6.3
AMPHIPODA				
Talitridae	2.2±3.7 (0.8)	2.9 (0.3)	55.6	10.5
GASTROPODA				
Lymnaeidae	0.8±3.3 (0.3)	261.6 (28.1)	11.1	7.3
BIVALVIA				
Sphaeriidae	0.4±1.6 (0.1)	1.0 (0.1)	5.6	1.0

Table **F.66.** Seasonal (fall) feeding habits of **5+** mountain whitefish **(n=3)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	1.0±1.0 (2.9)	1.0 (12.2)	66.7	17.5
DIPTERA				
Chironomidae larvae	30.0±45.9 (87.4)	7.2 (83.1)	100.0	58.0
Chironomidae pupae	2.0±2.0 (5.8)	0.05 (0.6)	66.7	15.7
AMPHIPODA				
Talitridae	1.3±2.3 (3.9)	0.4 (4.1)	33.3	8.8

Table **F.67.** Seasonal **(spring)** feeding habits of **3+** black crappie **(n=2) in** the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
EPHEMEROPTERA				
Tricorythidae	1.0±1.4 (1.4)	0.3 (1.3)	50.0	10.5
DIPTERA				
Chironomidae larvae	35.5±33.2 (50.4)	1.3 (65.0)	100.0	23.1
Ceratopogonidae	28.0±31.1 (39.7)	0.2 (10.0)	100.0	29.9
CLADOCERA				
Daphnidae	0.5±0.7 (0.7)	0.03 (1.3)	50.0	10.4
AMPHIPODA				
Talitridae	5.0±7.1 (7.1)	0.4 (21.3)	50.0	15.7
OSTRACODA	0.5±0.7 (0.7)	0.3 (1.3)	50.0	10.4

Table **F.67.** Seasonal **(spring)** feeding habits of **4+** black **crappie (n=7)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
EPHEMEROPTERA				
Baetidae	0.6±1.5 (0.2)	0.3 (1.2)	14.3	2.1
Tricorythidae	1.4±3.0 (0.4)	0.09 (0.3)	28.6	3.9
ODONATA				
Coenagriidae	0.9±2.3 (0.3)	0.4 (1.6)	14.3	2.1
HYDRACARINA	0.3±0.5 (0.1)	0.01 (0.06)	28.6	3.8
LEPIDOPTERA	0.1±0.4 (0.04)	0.01 (0.06)	14.3	1.9
DIPTERA				
Chironomidae larvae	118.7±103.6 (35.7)	13.7 (53.5)	85.7	23.1
Chironomidae pupae	0.6±0.5 (0.2)	0.01 (0.06)	57.1	7.6
Ceratopogonidae	136.1±151.1 (41.0)	9.0 (35.0)	85.7	21.4
HEMIPTERA				
Corixidae	0.1±0.4 (0.04)	1.34 (5.2)	14.3	2.6
COPEPODA				
Cyclopoida	47.4±76.7 (14.3)	0.06 (0.2)	57.1	9.5
CLADOCERA				
Daphnidae	11.6±28.9 (3.5)	0.01 (0.06)	28.6	4.2
AMPHIPODA				
Talitridae	3.6±7.7 (1.1)	0.7 (2.7)	57.1	8.0
OSTRACODA	10.9±18.4 (3.3)	0.01 (0.06)	71.4	9.9

Table **F.68.** Seasonal (spring) feeding habits of **5+** black crappie **(n=1)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
EPHEMEROPTERA				
Baetidae	3.0±0.0 (0.3)	0.1 (0.3)	100.0	10.1
Tricorythidae	230.0±0.0 (19.3)	8.7 (25.4)	100.0	14.5
ODONATA				
Coenagriidae	3.0±0.0 (0.3)	0.1 (0.3)	100.0	10.1
HYDRACARINA	1.0±0.0 (0.1)	0.1 (0.3)	100.0	10.0
DIPTERA				
Chironomidae larvae	927.0±0.0 (77.9)	23.6 (68.8)	100.0	24.7
Ceratopogonidae	20.0±0.0 (1.7)	1.5 (4.4)	100.0	10.6
COPEPODA				
Cyclopoida	2.0±0.0 (0.2)	0.1 (0.3)	100.0	10.0
AMPHIPODA				
Talitridae	4.0±0.0 (0.3)	0.1 (0.3)	100.0	10.1

Table **F.69.** Seasonal (summer) feeding habits of **1+** black crappie **(n=3)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
CLADOCERA				
Chydoridae	55.7±71.3 (43.3)	0.8 (94.1)	66.7	68.0
Cerodaphnia	73.0±126.4 (56.7)	0.05 (5.9)	33.3	32.0

Table **F.70.** Seasonal (summer) feeding habits of **2+** black crappie **(n=2)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
ODONATA				
Coenagriidae	0.5±0.7 (0.8)	1.0 (37.2)	50.0	14.7
DIPTERA				
Chironomidae larvae	3.5±3.5 (5.9)	0.6 (23.5)	100.0	21.6
Chironomidae pupae	[illegible]	0.1 (2.0)	50.0	[illegible]
Ceratopogonidae	17.5±21.9 (29.4)	0.3 (9.8)	100.0	[illegible]
COPEPODA				
Cyclopoida	36.0±50.9 (60.5)	0.1 (2.0)	50.0	18.8
AMPHIPODA				
Talitridae	1.0±1.4 (1.7)	0.7 (25.5)	50.0	12.9

Table **F.71.** Seasonal (summer) feeding habits of **3+** black crappie **(n=7)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
HYDRACARINA	2.7±3.9 (0.1)	0.1 (0.1)	42.9	8.6
DIPTERA				
Chironomidae larvae	3.0±3.0 (0.1)	1.4 (0.9)	71.4	14.5
Ceratopogonidae	1.3±1.4 (0.04)	0.6 (0.4)	57.1	11.5
COPEPODA				
Cyclopoida	593.0±1489.4 (16.5)	50.6 (34.0)	28.6	15.8
CLADOCERA				
Daphnidae	2974.4±4843.3(82.9)	91.3 (61.3)	57.1	40.3
AMPHIPODA				
Talitridae	8.3±21.5 (0.2)	4.6 (3.1)	28.6	6.4
OSTRACODA	4.6±12.1 (0.1)	0.4 (0.3)	14.3	2.9

Table **F.72.** Seasonal (summer) feeding habits of **4+** black crappie **(n=13)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
EPHEMEROPTERA				
Baetidae	2.2±5.4 (0.1)	3.7 (5.1)	23.1	5.0
ODONATA				
Coenagriidae	1.1±2.8 (0.05)	6.9 (9.5)	30.8	7.1
HYDRACARINA	0.2±0.6 (0.01)	0.03 (0.05)	7.7	1.4
DIPTERA				
Chironomidae larvae	2.8±3.9 (0.1)	1.1 (1.5)	61.5	11.1
Chironomidae pupae	5.1±7.8 (0.2)	1.3 (1.8)	61.5	11.2
Ceratopogonidae	3.5±4.9 (0.2)	0.7 (0.9)	53.8	9.6
Simuliidae larvae	0.08±0.3 (0.004)	0.1 (0.1)	7.7	1.4
COPEPODA				
Cyclopoida	14.1±50.5 (0.7)	1.9 (2.7)	15.4	3.3
CLADOCERA				
Daphnidae	6.9±25.0 (0.3)	0.03 (0.05)	7.7	1.4
Chydoridae	0.5±1.3 (0.03)	0.2 (0.3)	15.4	2.8
Cerodaphnia	1991 .0±5145.7 (96.7)	42.4 (58.8)	15.4	30.0
AMPHIPODA				
Talitridae	27.9±66.5 (1.4)	13.0 (18.0)	46.2	11.5
TERRESTRIAL INSECTS	3.5±10.0 (0.2)	0.9 (1.2)	23.1	4.3

Table **F.73** Seasonal (summer) feeding habits of **5+** black crappie **(n=1)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
DIPTERA				
Ceratopogonidae	1 .0 (100.0)	0.1 (100.0)	100.0	100.0

Table **F.74.** Seasonal (fall) feeding habits of **0+** black crappie **(n=23)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
EPHEMEROPTERA				
Baetidae	0.09±0.3 (0.3)	0.05 (2.4)	8.7	2.4
DIPTERA				
Chironomidae larvae	1.6±2.2 (5.9)	0.4 (19.5)	56.5	17.3
COPEPODA				
Cyclopoid	16.1±16.8 (60.6)	1.0 (51.2)	95.6	43.8
CLADOCERA				
Daphnidae	6.2±11.2 (23.4)	0.05 (2.4)	43.5	14.6
Chydoridae	1.5±2.3 (5.7)	0.4 (19.5)	52.2	16.3
AMPHIPODA				
Talitridae	0.6±3.1 (2.4)	0.05 (2.4)	4.4	1.9
OSTRACODA	0.4±1.5 (1.6)	0.05 (2.4)	13.0	3.6

Table **F.75.** Seasonal (fall) feeding habits of **1+** black crappie **(n=5)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
EPHEMEROPTERA				
Baetidae	1.0±1.4 (0.07)	0.1 (0.2)	40.0	6.5
PLECOPTERA				
Nemouridae	0.4±0.9 (0.03)	0.1 (0.2)	20.0	3.3
DIPTERA				
Chironomidae larvae	1.6±3.6 (0.1)	0.1 (0.2)	20.0	3.3
Chironomidae pupae	0.2±0.4 (0.01)	0.1 (0.2)	20.0	3.3
COPEPODA				
Cyclopoida	49.2±65.2 (3.5)	2.5 (6.4)	100.0	17.7
CLADOCERA				
Chydoridae	2.2±2.7 (0.2)	36.1 (91.9)	60.0	24.5
Cerodaphnia	1356±1351 (95.9)	0.1 (0.2)	80.0	28.4
AMPHIPODA				
Talitridae	0.6±0.9 (0.04)	0.1 (0.2)	40.0	6.5
OSTRACODA	2.4±4.3 (0.2)	0.1 (0.2)	40.0	6.5

Table **F.76.** Seasonal (fall) feeding habits of **2+** black crappie **(n=2)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
DIPTERA				
Chironomidae pupae	0.5±0.7 (0.01)	0.1 (0.2)	50.0	12.6
COPEPODA				
Cyclopoida	1067±1508 (27.0)	42.1 (66.7)	50.0	35.9
CLADOCERA				
Cerodaphnia	2875±4066 (72.9)	20.1 (31.8)	50.0	38.7
AMPHIPODA				
Talitridae	1.5±2.1 (0.04)	0.8 (1.3)	50.0	12.8

Table **F.77.** Seasonal **(fall)** feeding habits of **3+** black crappie **(n=8)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
EPHEMEROPTERA				
Baetidae	4.9±6.3 (0.3)	17.5 (9.4)	75.0	12.3
HYDRACARINA	0.4±1.1 (0.03)	0.1 (0.05)	12.5	1.8
DIPTERA				
Chironomidae larvae	3.0±5.4 (0.2)	1.1 (0.6)	50.0	7.4
Chironomidae pupae	3.4±5.7 (0.2)	1.7 (0.9)	62.5	9.2
COPEPODA				
Cyclopoida	2.8±3.0 (0.2)	0.2 (0.1)	75.0	11.0
CLADOCERA				
Daphnidae	1458.8±2000 (98.6)	156.9 (84.0)	62.5	35.6
Chydoridae	1.8±3.8 (0.1)	0.9 (0.5)	37.5	5.5
AMPHIPODA				
Talitridae	3.0±4.6 (0.2)	1.4 (0.8)	50.0	7.4
TERRESTRIAL INSECTS	1.4±1.7 (0.1)	6.9 (3.7)	62.5	9.6

Table **F.78.** Seasonal (fall) feeding habits of **4+** black crappie **(n=3)** in the **Pend Oreille River.**

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	0.3±0.6 (0.2)	1.0 (2.2)	33.3	5.4
EPHEMEROPTERA				
Baetidae	2.7±2.9 (1.4)	5.7 (12.6)	100.0	17.1
DIPTERA				
Chironomidae larvae	3.3±3.1 (1.8)	0.9 (2.0)	66.7	10.6
CLADOCERA				
Daphnidae	1.3±2.3 (0.7)	1.0 (2.2)	33.3	5.4
Chydoridae	160.0±139.4 (85.1)	21.1 (46.6)	66.7	29.8
AMPHIPODA				
Talitridae	18.0±7.6 (9.6)	14.3 (31.6)	100.0	21.2
OSTRACODA	2.3±3.2 (1.2)	1.3 (2.9)	66.7	10.6

Table **F.79.** Seasonal (fall) feeding habits of **6+** black crappie **(n=1)** in the **Pend Oreille River.**

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
DIPTERA				
Chironomidae larvae	7.0±0.0 (63.6)	0.1 (5.6)	100.0	42.3
Chironomidae pupae	4.0±0.0 (36.4)	1.7 (94.4)	100.0	57.7

Table **F.80.** Seasonal (spring) feeding habits of **0+** brown trout **(n=1)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
EPHEMEROPTERA				
Baetidae	18.0 (100.0)	29.0 (100.0)	100.0	100.0

Table **F.81.** Seasonal (spring) feeding habits of **2+** brown trout **(n=2)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
EPHEMEROPTERA				
Baetidae	3.0±4.2 (8.5)	2.7 (9.1)	50.0	19.3
AMPHIPODA				
Talitridae	2.5±3.5 (7.0)	0.9 (3.0)	50.0	17.1
OSTEICHTHYES				
Unidentifiable	30.0±42.4 (84.5)	26.2 (87.9)	50.0	63.5

Table **F.82.** Seasonal (spring) feeding habits of **3+** brown trout **(n=10)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Leptoceridae	0.3±0.7 (1.9)	0.9 (1.6)	20.0	4.7
EPHEMEROPTERA				
Baetidae	7.3±10.7 (45.1)	5.1 (9.7)	70.0	25.0
ODONATA				
Coenagrlidae	1.1±3.1 (6.8)	2.8 (5.4)	20.0	6.4
Lestidae	0.1±0.3 (0.6)	0.2 (0.4)	10.0	2.2
Aeshnidae	0.6±0.8 (3.7)	18.5 (35.5)	40.0	15.8
COLEOPTERA				
Elmidae larvae	3.0±9.5 (18.5)	0.6 (1.1)	10.0	5.9
Dytiscidae	0.1±0.3 (0.6)	0.7 (1.3)	10.0	2.4
LEPIDOPTERA	0.2±0.6 (1.2)	1.9 (3.6)	10.0	3.0
DIPTERA				
Chironomidae larvae	0.1±0.3 (0.6)	0.3 (0.5)	10.0	2.2
Chironomidae pupae	0.4±1.3 (2.5)	1.1 (2.0)	10.0	2.9
AMPHIPODA				
Talitridae	1.2±3.5 (7.4)	0.5 (1.0)	30.0	7.7
Gammaridae	0.1±0.3 (0.6)	0.1 (0.2)	10.0	2.2
GASTROPODA				
Lymnaeidae	1.5±3.4 (9.3)	15.6 (29.9)	30.0	13.8
Physidae	0.1±0.3 (0.6)	0.9 (1.7)	10.0	2.5
OSTEICHTHYES				
Unidentifiable	0.1±0.3 (0.6)	3.2 (6.0)	10.0	3.3

Table **F.83.** Seasonal (summer) feeding habits of **1+** brown trout **(n=1)** in **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
ODONATA				
Coenagriidae	6.0 (100.0)	1 .0 (100.0)	100.0	100.0

Table **F.84.** Seasonal (summer) feeding habits of **2+** brown trout **(n=2)** in **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
DIPTERA				
Chironomidae pupae	10.0±11.3 (100.0)	0.1 (100.0)	100.0	100.0

Table **F.85.** Seasonal (summer) feeding habits of **7+** brown trout **(n=1)** in **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
EPHEMEROPTERA				
Baetidae	1.0±0.0 (12.5)	0.1 (0.05)	100.0	22.5
DIPTERA				
Chironomidae pupae	1.0±0.0 (12.5)	169.5 (84.4)	100.0	39.4
OLIGOCHAETA				
Naididae	6.0±0.0 (75.0)	31.1(15.5)	100.0	38.1

Table **F.86.** Seasonal (fall) feeding habits of **2+** brown trout **(n=1)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
DIPTERA				
Chironomidae pupae	51 (98.1)	12.6 (99.2)	100.0	74.2
Ceratopogonidae	1.0 (1.9)	0.1 (0.8)	100.0	25.8

Table **F.87.** Seasonal (spring) feeding habits of **3+** cutthroat trout **(n=1)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
PLECOPTERA	1.0 (3.6)	2.5 (2.8)	100.0	17.7
DIPTERA				
Chironomidae pupae	19.0 (67.9)	1.6 (1.8)	100.0	28.3
CLADOCERA				
Daphnidae	5.0 (17.6)	0.1 (0.1)	100.0	19.6
OSTEICHTHYES				
Unidentifiable	3.0± (10.7)	85.4 (95.3)	100.0	34.3

Table **F.88.** Seasonal (spring) feeding habits of **4+** cutthroat trout **(n=2)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
PLECOPTERA	0.5±0.7 (0.2)	0.1 (0.1)	50.0	8.2
ODONATA				
Coenagriidae	0.5±0.7 (0.2)	0.1 (0.1)	50.0	8.2
COLEOPTERA	0.5±0.7 (0.2)	0.1 (0.1)	50.0	8.2
DIPTERA				
Chironomidae larvae	1.5±0.7 (0.7)	0.1 (0.1)	100.0	16.5
Chironomidae pupae	205.0±199.4 (97.4)	30.4 (47.1)	100.0	40.0
GASTROPODA				
Planorbidae	0.5±0.7 (0.2)	16.8 (26.1)	50.0	12.5
OSTEICHTHYES				
Unidentifiable	2.0±2.8 (1.0)	17.1 (26.4)	10.7	6.2

Table **F.89.** Seasonal (summer) feeding habits of **1+ kokanee (n=2)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
DIPTERA				
Chironomidae larvae	0.5±0.7 (0.04)	0.1 (0.2)	50.0	11.2
Chironomidae pupae	0.5±0.7 (0.04)	0.1 (0.2)	50.0	11.2
COPEPODA				
Cyclopoida	810±1145.5 (67.9)	23.6 (51.4)	50.0	37.6
CLADOCERA				
Daphnidae	380±537.4 (31.9)	22 (47.9)	50.0	28.8
Chydoridae	2.0±2.8 (0.2)	0.1 (0.2)	50.0	11.2

Table **F.90.** Seasonal (fall) feeding habits of **2+ kokanee (n=1)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
CLADOCERA				
Daphnidae	11,900 (100.0)	56.7 (100.0)	100.0	100.0

Table **F.91.** Seasonal (spring) feeding habits of **3+** pumpkinseed **(n=1)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
COLEOPTERA				
Elmidae larvae	1.0±0.0 (20.0)	0.1 (14.3)	100.0	22.4
DIPTERA				
Tipulidae	1.0±0.0 (20.0)	0.1 (14.3)	100.0	22.4
AMPHIPODA				
Talitridae	2.0±0.0 (40.0)	0.1 (14.3)	100.0	25.7
OLIGOCHAETA				
Lumbriculidae	1.0±0.0 (20.0)	0.4 (57.1)	100.0	29.5

Table **F.92.** Seasonal (spring) feeding habits of **4+** pumpkinseed **(n=1)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN± SD(%)	%	%
TRICHOPTERA				
Hydroptilidae	1.0±0.0 (25.0)	0.3 (50.0)	100.0	29.2
DIPTERA				
Chironomidae larvae	1.0±0.0 (25.0)	0.1 (16.7)	100.0	23.6
Chironomidae pupae	1.0±0.0 (25.0)	0.1 (16.7)	100.0	23.6
CLADOCERA				
Daphnidae	1.0±0.0 (25.0)	0.1 (16.7)	100.0	23.6

Table **F.93.** Seasonal (spring) feeding habits of **5+** pumpkinseed **(n=5)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
EPHEMEROPTERA				
Baetidae	0.4±0.6 (5.6)	0.1 (1.0)	40.0	11.1
COLEOPTERA				
Elmidae larvae	0.2±0.5 (2.8)	0.02 (0.2)	20.0	5.5
DIPTERA				
Chironomidae larvae	4.0±8.4 (55.6)	0.4 (4.1)	40.0	99.7
Chironomidae pupae	0.4±0.6 (5.6)	0.02 (0.2)	40.0	10.9
Tipulidae	0.6±1.3 (8.3)	0.5 (5.0)	20.0	7.9
AMPHIPODA				
Talitridae	0.2±0.5 (2.8)	0.02 (0.2)	20.0	5.5
OLIGOCHAETA				
Lumbriculidae	1.4±2.2 (19.4)	9.2 (89.4)	40.0	35.4

Table **F.94.** Seasonal (spring) feeding habits of **6+** pumpkinseed **(n=8)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN + SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	0.3±0.7 (1.0)	0.01 (0.1)	12.5	2.9
EPHEMEROPTERA				
Baetidae	0.1±0.4 (0.5)	0.01 (0.1)	12.5	2.8
ODONATA				
Coenagriidae	0.3±0.7 (1.0)	0.01 (0.1)	12.5	2.8
COLEOPTERA				
Elmidae larvae	0.8±1.4 (3.1)	0.01 (0.1)	37.5	8.8
DIPTERA				
Chironomidae larvae	13.4±14.9 (54.3)	1.6 (7.0)	62.5	26.6
Chironomidae pupae	5.9±14.2 (23.9)	0.01 (0.1)	50.0	15.9
Tipulidae	1.8±5.0 (7.1)	2.8 (12.0)	12.5	4.6
OSTRACODA	0.1±0.4 (0.5)	0.1 (0.3)	12.5	2.9
GASTROPODA				
Planorbidae	0.3±0.5 (1 .0)	0.6 (2.5)	25.0	6.1
OLIGOCHAETA				
Lumbriculidae	1.9±2.6 (7.6)	18.2 (77.9)	37.5	26.5

Table **F.95.** Seasonal (summer) feeding habits of **0+** pumpkinseed **(n=1)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
DIPTERA				
Chironomidae larvae	1.0±0.0 (33.3)	0.1 (4.2)	100.0	27.5
CLADOCERA				
Chydoridae	1.0±0.0 (33.3)	1.2 (50.0)	100.0	36.7
OSTRACODA	1.0±0.0 (33.3)	1.1 (45.8)	100.0	35.8

Table **F.96.** Seasonal (summer) feeding habits of **1+** pumpkinseed **(n=3)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	4.0±6.1 (11.9)	1.0 (30.9)	33.3	11.4
PLECOPDTERA				
Chloroperlidae	0.7±1.2 (2.0)	0.05 (1.5)	33.3	5.5
DIPTERA				
Chironomidae larvae	6.7±2.5 (19.8)	0.6 (17.6)	100.0	20.6
Ceratopogonidae	3.3±3.5 (9.9)	0.05 (1.5)	66.7	11.7
COPEPODA				
Cyclopoida	0.3±0.6 (1.0)	0.05 (1.5)	33.3	5.4
CLADOCERA				
Daphnidae	4.3±4.0 (12.9)	0.6 (16.2)	66.7	14.4
OSTRACODA	13.7±11.7 (40.6)	0.3 (8.8)	100.0	22.4
GASTROPODA				
Planorbidae	0.7±1.2 (2.0)	0.8 (22.1)	33.3	8.6

Table **F.97.** Seasonal (summer) feeding habits of **2+** pumpkinseed **(n=8)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	10.0±16.6 (21.6)	1.6 (10.3)	50.0	12.4
Leptoceridae	0.1±0.4 (0.3)	0.05 (0.3)	12.5	2.0
COLEOPTERA				
Elmidae larvae	0.2±0.7 (0.5)	0.6 (0.3)	12.5	2.0
HYDRACARINA	0.2±0.5 (0.5)	0.05 (0.3)	25.0	3.9
DIPTERA				
Chironomidae larvae	9.9±10.9 (21.3)	1.1 (7.0)	100.0	19.5
Ceratopogonidae	3.8±7.1 (8.1)	1.0 (6.4)	75.0	13.6
CLADOCERA				
Chydoridae	0.2±0.5 (0.5)	0.05 (0.3)	25.0	3.9
AMPHIPODA				
Talitridae	11.6±26.5 (25.1)	8.6 (55.4)	37.5	17.9
OSTRACODA	7.2±11.5 (15.6)	0.05 (0.3)	62.5	11.9
GASTROPODA				
Planorbidae	3.0±2.8 (6.5)	2.5 (16.0)	62.5	12.9

Table **F.98.** Seasonal (summer) feeding habits of **3+** pumpkinseed **(n=10)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	2.8±5.0 (9.7)	0.4 (1.2)	40.0	8.9
EPHEMEROPTERA				
Tricorythidae	1.3±4.1 (4.5)	0.6 (1.8)	10.0	2.9
ODONATA				
Coenagriidae	0.2±0.4 (0.7)	3.9 (10.8)	20.0	5.5
HYDRACARINA	0.1±0.3 (0.4)	0.1 (0.3)	10.0	1.9
DIPTERA				
Chironomidae larvae	15.3±24.1 (52.9)	7.4 (20.7)	80.0	27.0
Chironomidae pupae	0.7±1.3 (2.4)	3.0 (8.3)	40.0	8.9
Ceratopogonidae	3.0±5.1 (10.4)	1.6 (4.6)	70.0	14.9
AMPHIPODA				
Talitridae	0.7±1.2 (2.4)	0.05 (0.1)	30.0	5.7
OSTRACODA	0.9±1.7 (3.1)	0.4 (1.2)	30.0	6.0
GASTROPODA				
Planorbidae	3.6±7.4 (12.5)	17.0 (47.4)	30.0	15.8
OLIGOCHAETA				
Lumbriculidae	0.3±1.0 (1.0)	1.2 (3.5)	10.0	2.5

Table **F.99.** Seasonal (summer) feeding habits of **4+** pumpkinseed **(n=10)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	1.7±3.3 (7.5)	0.2 (0.9)	40.0	7.3
Leptoceridae	0.1±0.3 (0.4)	0.6 (2.5)	10.0	2.0
EPHEMEROPTERA				
Ephemerellidae	0.1±0.3 (0.4)	5.0 (22.8)	10.0	5.0
ODONATA				
Coenagriidae	0.4±0.7 (1.8)	2.7 (12.3)	30.0	6.7
COLEOPTERA				
Elmidae larvae	0.5±1.3 (2.2)	1.3 (5.9)	20.0	4.3
Elmidae adult				
HYDRACARINA	1.0±1.9 (4.4)	0.6 (2.5)	30.0	5.6
DIPTERA				
Chironomidae larvae	7.8±8.4 (34.5)	2.0 (8.9)	90.0	20.2
Chironomidae pupae	0.3±0.5 (1.3)	0.1 (0.5)	20.0	3.3
Ceratopogonidae	7.9±10.9 (35.0)	1.5 (6.8)	80.0	18.5
Simuliidae larvae	0.1±0.3 (0.4)	0.05 (0.2)	10.0	1.6
CLADOCERA				
Daphnidae	0.2±0.4 (0.9)	0.2 (0.7)	20.0	3.3
AMPHIPODA				
Talitridae	1.2±1.1 (5.3)	0.2 (0.9)	60.0	10.0
GASTROPODA				
Planorbidae	1.2±2.1 (5.3)	7.6 (34.7)	30.0	10.6
Lymnaeidae	0.1±0.3 (0.4)	0.05 (0.2)	10.0	1.6

Table **F.100.** Seasonal (summer) feeding habits of **5+** pumpkinseed **(n=6)** in the **Pend Oreille River.**

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	10.0±23.1 (22.2)	1.2 (2.4)	33.3	6.8
Leptoceridae	0.7±0.8 (1.5)	0.1 (0.2)	50.0	6.1
EPHEMEROPTERA				
Tricorythidae	0.2±0.4 (0.4)	0.05 (0.1)	16.7	2.0
ODONATA				
Coenagriidae	0.5±0.6 (1.1)	1.4 (3.7)	50.0	6.4
COLEOPTERA				
Elmidae adult	0.2±0.4 (0.4)	0.1 (0.2)	16.7	2.0
Curculionidae	0.2±0.4 (0.4)	0.05 (0.1)	16.7	2.0
HYDRACARINA	7.2±17.1 (15.9)	0.4 (0.8)	33.3	5.9
DIPTERA				
Chironomidae larvae	4.0±3.8 (8.9)	0.2 (0.3)	83.3	10.9
Chironomidae pupae	1.3±1.5 (3.0)	0.1 (0.2)	50.0	6.3
Ceratopogonidae	5.8±8.4 (13.0)	0.9 (1.8)	66.7	9.6
CLADOCERA				
Daphnidae	0.2±0.4 (0.4)	0.05 (0.1)	16.7	2.0
Chydoridae	0.3±0.8 (0.7)	0.05 (0.1)	16.7	2.0
AMPHIPODA				
Talitridae	2.0±1.8 (4.4)	0.5 (1.0)	66.7	8.5
OSTRACODA	0.3±0.8 (0.7)	0.1 (0.2)	16.7	2.1
GASTROPODA				
Planorbidae	7.2±16.6 (15.9)	9.6 (19.6)	33.3	8.1
OLIGOCHAETA				
Lumbriculidae	2.5±5.2 (5.6)	30.4 (62.4)	50.0	13.9
TERRESTRIAL INSECTS				
Unknown	0.3±0.8 (0.7)	0.05 (0.1)	16.7	2.0
Simuliidae	2.0±4.9 (4.4)	3.2 (6.7)	16.7	3.3

Table **F.101.** Seasonal (summer) feeding habits of **6+** pumpkinseed **(n=13)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	0.9±1.4 (6.0)	0.4 (1.1)	38.5	7.7
Limnephilidae	0.4±1.1 (2.5)	0.4 (1.0)	23.1	4.5
Polycentropidae	1.0±1.9 (6.5)	0.4 (1.0)	23.1	5.2
ODONATA				
Coenagriidae	1.3±4.2 (8.5)	20.4 (51.5)	15.4	12.7
COLEOPTERA				
Elmidae larvae	1.0±1.9 (6.5)	2.2 (5.6)	30.8	7.2
HYDRACARINA	2.2±7.8 (13.9)	0.7 (1.8)	7.7	4.0
DIPTERA				
Chironomidae larvae	3.3±3.8 (21.4)	1.8 (4.4)	61.5	14.7
Ceratopogonidae	1.9±1.8 (12.4)	0.9 (2.3)	76.9	15.5
CLADOCERA				
Daphnidae	0.2±0.4 (1.0)	0.05 (0.1)	15.4	2.8
Chydoridae	0.1±0.3 (0.5)	0.05 (0.1)	7.7	1.4
AMPHIPODA				
Talitridae	2.6±3.5 (16.9)	4.4 (11.0)	53.8	13.8
OSTRACODA	0.3±1.1 (2.0)	0.05 (0.1)	7.7	1.6
MYSIDACEA				
Mysis	0.1±0.3 (0.5)	0.8 (2.0)	7.7	1.7
GASTROPODA				
Planorbidae	0.1±0.3 (0.5)	3.3 (8.3)	7.7	2.8
BIVALVIA				
Sphaeriidae	0.2±0.4 (1.0)	3.8 (9.6)	15.4	4.4

Table **F.102.** Seasonal (summer) feeding habits of **7+** pumpkinseed **(n=1)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	4.0±0.0 (19.0)	0.1 (2.1)	100.0	
DIPTERA				
Chironomidae larvae	5.0±0.0 (23.8)	0.1 (2.1)	100.0	17.9
Ceratopogonidae	2.0±0.0 (9.5)	0.6 (12.8)	100.0	17.5
AMPHIPODA				
Talitridae	9.0±0.0 (42.9)	3.4 (72.3)	100.0	30.8
GASTROPODA				
Lymnaeidae	1.0±0.0 (4.8)	0.5 (10.6)	100.0	16.5

Table **F.103.** Seasonal (fall) feeding habits of **0+** pumpkinseed **(n=2)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
DIPTERA				
Chironomidae larvae	4.5±5.0 (39.1)	0.1 (25.0)	100.0	36.4
CLADOCERA				
Chydoridae	0.5±0.7 (4.4)	0.1 (25.0)	50.0	17.6
OSTRACODA	6.0±8.5 (52.2)	0.1 (25.0)	50.0	28.3
GASTROPODA				
Planorbidae	0.5±0.7 (4.4)	0.1 (25.0)	50.0	17.6

Table **F.104.** Seasonal (fall) feeding habits of **1+** pumpkinseed **(n=5)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	0.4±0.6 (2.2)	0.6(23.9)	40.0	12.7
COLEOPTERA				
Elmidae larvae	0.2±0.4 (1.1)	0.05 (2.2)	20.0	4.4
DIPTERA				
Chironomidae larvae	5.0±2.7 (27.5)	0.6 (28.3)	100.0	30.0
CLADOCERA				
Daphnidae	6.4±14.3 (35.2)	0.05 (2.2)	20.0	11.0
AMPHIPODA				
Talitridae	0.6±0.6 (3.3)	0.6 (26.1)	60.0	17.2
OSTRACODA	5.6±4.7 (30.8)	0.4 (17.4)	80.0	24.6

Table **F.105.** Seasonal (fall) feeding habits of **2+** pumpkinseed **(n=9)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)		%
TRICHOPTERA				
Hydroptilidae	1.2±1.8 (5.0)	0.5 (5.8)	44.4	8.7
Leptoceridae	0.4±0.9 (1.8)	0.05 (0.6)	22.2	3.9
Tricorythidae	0.1±0.3 (0.4)	0.05 (0.6)	11.1	1.9
DIPTERA				
Chironomidae larvae	6.9±9.9 (28.2)	1.1 (12.6)	88.9	20.5
Chironomidae pupae	0.1±0.3 (0.4)	0.05 (0.6)	11.1	1.9
CLADOCERA				
Daphnidae	2.0±4.6 (8.2)	0.5 (5.8)	33.3	7.5
Chydoridae	2.3±7.0 (9.6)	0.05 (0.6)	11.1	3.4
AMPHIPODA				
Talitridae	1.3±2.4 (5.5)	0.8 (8.6)	33.3	7.5
OSTRACODA	1.7±2.4 (6.8)	0.05 (0.6)	44.4	8.2
GASTROPODA				
Planorbidae	1.2±1.5 (5.0)	2.6 (29.3)	44.4	12.4
TERRESTRIAL INSECTS	6.9±9.9 (28.2)	2.0 (23.6)	77.8	20.5
BIVALVIA				
Sphaeriidae	0.2±0.7 (0.9)	1.0 (11.5)	11.1	3.7

Table **F.106.** Seasonal (fall) feeding habits of **3+** pumpkinseed **(n=8)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	0.9±1.7 (2.7)	0.05 (0.2)	37.5	5.5
Leptoceridae	0.6±1 .1 (2.0)	0.05 (0.2)	37.5	5.4
COLEOPTERA				
Elmidae larvae	0.5±1 .1 (1.6)	0.05 (0.2)	25.0	3.6
HYDRACARINA	0.1±0.4 (0.4)	0.05 (0.2)	12.5	1.8
DIPTERA				
Chironomidae larvae	11.4±13.7 (35.4)	2.7 (9.4)	75.0	16.2
Chironomidae pupae	1.0±2.1 (3.1)	0.8 (2.8)	25.0	4.2
Ceratopogonidae	0.1±0.4 (0.4)	0.05 (0.2)	12.5	1.8
COPEPODA				
Cyclopoida	0.1 ±0.4 (0.4)	0.05 (0.2)	12.5	1.8
CLADOCERA				
Chydoridae	1.0±1.4 (3.1)	0.8 (3.0)	50.0	7.6
AMPHIPODA				
Talitridae	2.4±2.7 (7.4)	1.3 (4.5)	75.0	11.8
OSTRACODA	6.4±8.7 (19.8)	0.05 (0.2)	62.5	11.2
GASTROPODA				
Planorbidae	6.4±7.9 (19.8)	20.0 (69.5)	75.0	22.3
TERRESTRIAL INSECTS	0.2±0.7 (0.8)	0.05 (0.2)	12.5	1.8
BIVALVIA				
Sphaeriidae	1.0±2.4 (3.1)	2.7 (9.4)	25.0	5.1

Table **F.107.** Seasonal (fall) feeding habits of **4+** pumpkinseed **(n=6)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	0.3±0.5 (0.2)	0.3 (1.4)	33.3	4.9
Leptoceridae	11.0±12.8 (8.2)	0.6 (2.6)	50.0	8.5
EPHEMEROPTERA				
Baetidae	0.2±0.4 (0.1)	0.6 (2.8)	16.7	2.7
ODONATA				
Coenagriidae	0.5±1.2 (0.4)	5.4 (25.4)	16.7	5.9
COLEOPTERA				
Elmidae larvae	0.2±0.4 (0.1)	1.0 (4.7)	16.7	3.0
HYDRACARINA	1.0±1.6 (0.8)	0.05 (0.2)	50.0	7.1
DIPTERA				
Chironomidae larvae	42.5±100.2 (31.9)	7.1 (33.4)	66.7	18.4
Chironomidae pupae	8.5±14.9 (6.4)	0.05 (0.2)	50.0	7.9
COPEPODA				
Cyclopoida	0.3±0.5 (0.2)	0.8 (3.5)	33.3	5.2
CLADOCERA				
Daphnidae	63.0±152.8 (47.2)	0.05 (0.2)	33.3	11.3
Chydoridae	0.8±1.6 (0.6)	0.2 (0.9)	33.3	4.8
AMPHIPODA				
Talitridae	0.3±0.8 (0.2)	0.2 (1.2)	16.7	2.5
OSTRACODA	0.3±0.8 (0.2)	0.05 (0.2)	16.7	2.4
GASTROPODA				
Planorbidae	4.2±5.9 (3.1)	4.8 (22.8)	66.7	12.9
TERRESTRIAL INSECTS	0.2±0.4 (0.1)	0.05 (0.2)	16.7	2.4

Table **F.108.** Seasonal (fall) feeding **habits** of **5+** pumpkinseed **(n=6)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Leptoceridae	0.2±0.4 (0.9)	0.05 (0.6)	16.7	3.8
COLEOPTERA				
Curcilionidae	0.2±0.4 (0.9)	0.05 (0.6)	16.7	3.8
DIPTERA				
Chironomidae larvae	3.0±5.9 (16.4)	0.7 (8.2)	66.7	18.9
Ceratopogonidae	0.2±0.4 (0.9)	0.4 (4.7)	16.7	4.6
CLADOCERA				
Daphnidae	9.2±22.4 (50.0)	0.05 (0.6)	16.7	13.9
Chydoridae	1.8±4.5 (10.0)	1.1 (12.9)	16.7	8.2
AMPHIPODA				
Talitridae	0.5±0.8 (2.7)	1.8 (21.8)	33.3	11.9
OSTRACODA	2.2±4.8 (11.8)	0.6 (6.5)	33.3	10.7
GASTROPODA				
Planorbidae	1.0±1.3 (5.5)	3.7 (43.5)	50.0	20.5
TERRESTRIAL INSECTS	0.2±0.4 (0.9)	0.05 (0.6)	16.7	3.8

Table **F.145.** Seasonal (fall) feeding **habits** of **6+** pumpkinseed **(n=11)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	0.09±0.3 (0.6)	0.05 (0.1)	9.1	1.8
Leptoceridae	0.3±0.5 (1.6)	0.05 (0.1)	27.3	5.4
Phryganeidae	0.09±0.3 (0.6)	4.4 (12.8)	9.1	4.2
HYDRACARINA	0.09±0.3 (0.6)	0.7 (2.0)	9.1	2.2
DIPTERA				
Chironomidae larvae	6.4±8.7 (38.4)	3.8 (10.9)	90.9	26.1
Chironomidae pupae	0.5±0.8 (3.3)	1.0 (2.7)	36.4	7.9
Ceratopogonidae	0.09±0.3 (0.6)	0.1 (0.3)	9.1	1.9
CLADOCERA				
Daphnidae	0.4±0.9 (2.2)	0.05 (0.1)	18.2	3.8
Chydoridae	0.3±0.6 (1.6)	0.4 (1.2)	18.2	3.9
AMPHIPODA				
Talitridae	2.6±5.0 (15.9)	1.3 (3.7)	36.4	10.4
GASTROPODA				
Planorbidae	5.6±9.0 (34.1)	20.8 (59.6)	63.6	29.3
Physidae	0.09±0.3 (0.6)	2.2 (6.3)	9.1	3.0

Table **F.146.** Seasonal (spring) feeding habits of **5+ tench (n=2)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
DIPTERA				
Chironomidae larvae	1.0±0.0 (12.5)	0.05 (25.0)	100.0	30.5
Chironomidae pupae	5.0±7.1 (62.5)	0.05 (25.0)	50.0	30.5
NEMATODA	0.5±0.7 (6.3)	0.05 (25.0)	50.0	18.1
BIVALVIA				
Sphaeriidae	1.5±2.1 (18.8)	0.05 (25.0)	50.0	20.8

Table **F.147.** Seasonal (spring) feeding habits of **6+ tench (n=2)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
HYDRACARINA	1.0±1.4 (33.3)	0.05 (20.0)	50.0	25.8
DIPTERA				
Chironomidae larvae	1.0±1.4 (33.3)	0.05 (20.0)	50.0	25.8
Chironomidae pupae	1.0±0.0 (33.3)	0.2 (60.0)	100.0	48.3

Table **F.148.** Seasonal (spring) feeding habits of **7+ tench (n=1)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
EPHEMEROPTERA				
Baetidae	1.0 (5.9)	1.4 (18.2)	100.0	17.8
DIPTERA				
Chironomidae larvae	9.0 (52.9)	1.9 (24.7)	100.0	25.4
Chironomidae pupae	3.0 (17.7)	0.1 (1.3)	100.0	17.0
Ceratopogonidae	2.0 (11.8)	0.1 (1.3)	100.0	16.2
OLIGOCHAETA				
Lumbriculidae	2.0 (11.8)	4.1 (53.3)	100.0	23.6

Table **F.149.** Seasonal (spring) feeding habits of **8+ tench (n=1)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
OSTRACODA	1 .0 (100.0)	0.1 (100.0)	100.0	100.0

Table **F.150.** Seasonal (summer) feeding habits of **0+ tench (n=2)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	0.5±0.7 (6.7)	4.3 (43.4)	50.0	20.0
DIPTERA				
Chironomidae larvae	2.0±1.4 (26.7)	1.2 (12.1)	100.0	27.8
Ceratopogonidae	1.5±2.1 (20.0)	1.9 (19.1)	50.0	17.8
COPEPODA				
Cyclopoida	0.5±0.7 (6.7)	1.6 (16.1)	50.0	14.6
OSTRACODA	3.0±4.2 (40.0)	0.9 (9.1)	50.0	19.8

Table **F.151.** Seasonal (summer) feeding habits of **1+ tench (n=1)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	13.0 (4.1)	10.8 (2.0)	100.0	10.6
HYDRACARINA	3.0 (1.0)	0.1 (0.02)	100.0	10.1
DIPTERA				
Chironomidae larvae	26.0 (8.2)	49.3 (9.1)	100.0	11.7
Chironomidae pupae	14.0 (4.4)	15.8 (2.9)	100.0	10.7
COPEPODA				
Cyclopoida	1.0 (0.3)	0.1 (0.02)	100.0	10.0
CLADOCERA				
Chydoridae	1.0 (0.3)	11.6 (2.1)	100.0	10.2
OSTRACODA	256.0 (80.8)	453.8 (83.8)	100.0	26.4
GASTROPODA				
Planorbidae	3.0 (1.0)	0.1 (0.02)	100.0	10.1

Table **F.152.** Seasonal (summer) feeding habits of **3+ tench (n=1)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
HYDRACARINA	1.0 (4.8)	0.1 (50.0)	100.0	38.7
BIVALVIA				
Sphaeriidae	20.0 (95.2)	0.1 (50.0)	100.0	61.3

Table **F.153.** Seasonal (summer) feeding habits of **5+ tench (n=3)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
DIPTERA				
Chironomidae larvae	1.0±1.0 (20.0)	0.6 (24.1)	66.7	27.7
CLADOCERA				
Chydoridae	2.3±3.2 (46.7)	0.6 (24.1)	66.7	34.4
OSTRACODA	0.7±1.2 (13.3)	0.5 (18.5)	33.3	16.3
GASTROPODA				
Planorbidae	1.0±1.7 (20.0)	0.9 (33.3)	33.3	21.6

Table **F.154.** Seasonal (summer) feeding habits of **6+ tench (n=4)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	0.8±1.5 (5.4)	0.8 (12.1)	25.0	7.1
Leptoceridae	1.5±3.0 (10.9)	1.4 (19.9)	25.0	9.3
HYDRACARINA	0.5±1.0 (3.6)	0.6 (7.8)	25.0	6.1
DIPTERA				
Chironomidae larvae	1.0±0.8 (7.3)	0.6 (7.8)	75.0	15.0
Ceratopogonidae	0.5±0.6 (3.6)	0.6 (9.2)	50.0	10.5
COPEPODA				
Cyclopoida	0.2±0.5 (1.8)	0.2 (3.6)	25.0	5.1
CLADOCERA				
Chydoridae	2.8±5.5 (20.0)	0.9 (12.8)	25.0	9.6
AMPHIPODA				
Talitridae	0.2±0.5 (1.8)	1.0 (14.9)	25.0	7.0
OSTRACODA	4.8±7.6 (34.6)	0.6 (7.8)	50.0	15.4
GASTROPODA				
Planorbidae	0.2±0.5 (1.8)	0.2 (2.8)	25.0	4.9
NEMATODA	1.2±1.5 (9.0)	0.1 (1.4)	50.0	10.1

Table **F.155.** Seasonal (summer) feeding habits of **7+ tench (n=1)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Leptoceridae	2.0 (13.3)	0.1 (25.0)	100.0	23.0
DIPTERA				
Chironomidae larvae	9.0 (60.0)	0.1 (25.0)	100.0	30.8
AMPHIPODA				
Talitridae	3.0 (20.0)	0.1 (25.0)	100.0	24.1
GASTROPODA				
Planorbidae	1.0 (6.7)	0.1 (25.0)	100.0	22.1

Table **F.156.** Seasonal (summer) feeding habits of **8+ tench (n=1)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
DIPTERA				
Chironomidae larvae	1[illegible] (39.5)	4.2 (38.4)	100.0	21.2
Chironomidae pupae	4.0 (10.5)	0.05 (0.5)	100.0	17.8
Ceratopogonidae	1.0 (2.6)	0.05 (0.5)	100.0	12.3
COPEPODA				
Cyclopoida	1.0 (2.6)	0.1 (0.9)	100.0	12.4
AMPHIPODA				
Talitridae	5.0 (13.2)	0.4 (4.2)	100.0	14.0
GASTROPODA				
Planorbidae	12.0 (31.6)	6.0 (55.6)	100.0	22.3

Table **F.157.** Seasonal (fall) feeding habits of **1+ tench (n=4)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
HYDRACARINA	0.2±0.5 (0.6)	0.5 (9.3)	25.0	7.8
DIPTERA				
Chironomidae larvae	2.2±3.9 (5.5)	0.1 (1.8)	50.0	12.8
COPEPODA				
Cyclopoida	0.5±1.0 (1.2)	0.1 (1.8)	25.0	6.2
AMPHIPODA				
Talitridae	1.2±1.9 (3.0)	1.2 (22.2)	50.0	16.7
OSTRACODA	36.5±25.6 (89.0)	3.5 (64.8)	100.0	56.5

Table **F.158.** Seasonal (fall) feeding habits of **5+ tench (n=4)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
HYDRACARINA	1.0±1.2 (3.5)	0.8 (2.0)	50.0	7.7
DIPTERA				
Chironomidae larvae	3.2±1.9 (11.4)	1.2 (3.1)	100.0	15.8
Chironomidae pupae	0.5±1.0 (1.8)	0.5 (1.2)	25.0	3.9
Ceratopogonidae	0.8±1.5 (2.6)	0.9 (2.2)	25.0	4.1
CLADOCERA				
Chydoridae	9.2±15.8 (32.5)	15.7 (39.2)	100.0	23.7
AMPHIPODA				
Talitridae	2.5±3.0 (8.8)	1.0 (2.5)	50.0	8.5
OSTRACODA	0.2±0.5 (0.9)	0.05 (0.1)	25.0	3.6
GASTROPODA				
Planorbidae	7.5±10.5 (26.3)	17.6 (44.1)	75.0	20.1
TERRESTRIAL INSECTS	0.2±0.5 (0.9)	0.8 (2.1)	25.0	3.9
BIVALVIA				
Sphaeriidae	3.2±4.0 (11.4)	1.3 (2.1)	50.0	8.8

Table F.159. Seasonal (spring) feeding habits of 5+ largescale sucker (n=2) in the Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN± SD(%)	%	%
TRICHOPTERA				
Hydroptilidae	20.5±29.0 (1.7)	0.1 (0.03)	50.0	7.4
COLEOPTERA				
Elmidae larvae	0.5±0.7 (0.04)	0.8 (0.4)	50.0	7.2
DIPTERA				
Chironomidae larvae	959.5±672.5 (81.6)	75.9 (40.2)	100.0	31.7
Chironomidae pupae	55.0±73.5 (4.7)	6.9 (3.6)	100.0	15.5
Ceratopogonidae	1.0±1.4 (0.1)	0.5 (0.3)	50.0	7.2
COPEPODA				
Cyclopoida	11.5±16.3 (1.0)	0.8 (0.4)	50.0	7.3
OLIGOCHAETA				
Naididae	127.0±179.6 (10.8)	103.9 (55.0)	50.0	16.5
BIVALVIA				
Sphaeriidae	0.5±0.7 (0.04)	0.1 (0.05)	50.0	7.2

Table F.160. Seasonal (spring) feeding habits of 6+ largescale sucker (n=5) in the Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	5.4±12.1 (0.6)	0.5 (0.5)	20.0	1.9
EPHEMEROPTERA				
Baetidae	0.4±0.9 (0.05)	0.02 (0.02)	20.0	1.8
COLEOPTERA				
Elmidae larvae	7.8±9.7 (0.9)	1.8 (1.7)	80.0	7.2
HYDRACARINA	2.0±2.8 (0.2)	0.02 (0.02)	40.0	3.5
DIPTERA				
Chironomidae larvae	399.2±288.8 (45.3)	26.4 (25.6)	100.0	15.0
Chironomidae pupae	40.6±60.4 (4.6)	2.9 (2.9)	80.0	7.7
Ceratopogonidae	26.0±53.2 (3.0)	0.4 (0.4)	80.0	7.3
COPEPODA				
Cyclopoida	29.6±40.8 (3.4)	2.4 (2.3)	40.0	4.0
CLADOCERA				
Daphnidae	1.0±2.2 (0.1)	0.2 (0.2)	20.0	1.8
Chydoridae	23.0±51.4 (2.6)	0.4 (0.4)	20.0	2.0
AMPHIPODA				
Talitridae	15.8±16.1 (1.8)	2.0 (2.0)	60.0	5.6
OSTRACODA	5.0±5.7 (0.6)	0.4 (0.4)	80.0	7.1
GASTROPODA				
Planorbidae	67.2±66.5 (7.6)	19.2 (18.6)	80.0	9.3
Lymnaeidae	8.6±8.4 (1.0)	5.8 (5.6)	60.0	5.8
OLIGOCHAETA				
Lumbriculidae	2.2±3.0 (0.3)	2.3 (2.3)	40.0	3.7
Naididae	1.0±2.2 (0.1)	0.5 (0.5)	20.0	1.8
NEMATODA	236.4±523.0 (26.8)	6.3 (6.1)	40.0	6.4
BIVALVIA				
Sphaeriidae	9.8±12.1 (1 .1)	31.7 (30.7)	60.0	8.1

Table F.161. Seasonal (spring) feeding habits of 7+ largescale sucker (n=3) in the Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	0.33±0.6 (0.02)	0.3 (0.1)	33.3	4.4
ODONATA				
Coenagriidae	1.7±2.9 (0.1)	0.2 (0.1)	33.3	4.4
HYDRACARINA	0.3±0.6 (0.02)	0.1 (0.04)	33.3	4.4
DIPTERA				
Chironomidae larvae	1511.7±1528.1(91.3)	175.1 (73.6)	100.0	34.6
Chironomidae pupae	61.3±84.6 (3.7)	3.3 (1.4)	100.0	13.7
Ceratopogonidae	1.0±1.7 (0.06)	0.1 (0.06)	33.3	4.4
COPEPODA				
Cyclopoida	2.7±4.6 (0.2)	0.03 (0.01)	33.3	4.4
AMPHIPODA				
Talitridae	15.3±26.6 (0.9)	1.1 (0.5)	33.3	4.5
OSTRACODA	0.7±1.2 (0.04)	0.1 (0.03)	33.3	4.4
OLIGOCHAETA				
Lumbriculidae	0.3±0.6 (0.02)	2.3 (1.0)	33.3	4.5
NEMATODA	0.7±1.2 (0.04)	0.03 (0.01)	33.3	4.4
TERRESTRIAL INSECTS				
Formicidae	59.0±102.2 (3.6)	53.2 (22.4)	33.3	7.7
BIVALVIA				
Sphaeriidae	0.3±0.6 (0.02)	1.7 (0.7)	33.3	4.4

Table F.162. Seasonal (spring) feeding habits of 8+ largescale sucker (n=2) in the Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN± SD(%)	%	%
TRICHOPTERA				
Hydroptilidae	1.5±2.1 (0.2)	0.05 (0.1)	50.0	5.3
ODONATA				
Coenagriidae	0.5±0.7 (0.1)	0.05 (0.1)	50.0	5.3
COLEOPTERA				
Elmidae larvae	1.0±0.0 (0.1)	0.1 (0.2)	100.0	10.6
HYDRACARINA	1.5±2.1 (0.2)	0.05 (0.1)	50.0	5.3
DIPTERA				
Chironomidae larvae	558.0±756.6 (66.4)	38.7 (81.7)	100.0	26.1
Chironomidae pupae	102.0±144.3 (12.1)	5.0 (10.6)	50.0	7.7
Ceratopogonidae	1.5±0.7 (0.2)	0.2 (0.3)	100.0	10.6
COPEPODA				
Cyclopoida	10.0±14.1 (1.2)	0.2 (0.4)	50.0	5.4
CLADOCERA				
Chydoridae	150.5±212.84(17.9)	2.6 (5.4)	50.0	7.7
AMPHIPODA				
Talitridae	4.0±5.7 (0.5)	0.2 (0.4)	50.0	5.4
OSTRACODA	8.5±12.0 (1.0)	0.05 (0.1)	50.0	5.4
GASTROPODA				
Planorbidae	1.0±1.4 (0.1)	0.3 (0.5)	50.0	5.3

Table F.163. Seasonal (spring) feeding habits of 9+ largescale sucker (n=2) in the Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	0.5±0.7 (0.05)	0.2 (0.03)	50.0	3.5
EPHEMEROPTERA				
Baetidae	219.5±307.6 (20.3)	113.6 (20.4)	100.0	9.7
COLEOPTERA				
Elmidae larvae	2.0±2.8 (0.2)	0.5 (0.1)	50.0	3.5
LEPIDOPTERA	2.0±2.8 (0.2)	0.0.5 (0.01)	50.0	3.5
DIPTERA				
Chironomidae larvae	13.0±9.9 (1.2)	0.2 (0.03)	100.0	7.0
Chironomidae pupae	165.0±175.4 (15.3)	9.3 (1.7)	100.0	8.1
Ceratopogonidae	69.0±7.1 (6.4)	3.3 (0.6)	100.0	7.4
COPEPODA				
Cyclopoida	14.5±19.1 (1.3)	0.1 (0.02)	100.0	7.0
CLADOCERA				
Chydoridae	528.0±591 .1 (48.9)	36.7 (6.6)	100.0	10.7
AMPHIPODA				
Talitridae	0.5±0.7 (0.05)	0.05 (0.01)	50.0	3.5
OSTRACODA	1.0±1.4 (0.1)	0.05 (0.01)	50.0	3.5
GASTROPODA				
Planorbidae	2.5±0.7 (0.2)	0.9 (0.2)	100.0	6.9
Lymnaeidae	15.0±11.3 (1.4)	0.2 (0.03)	100.0	7.0
OLIGOCHAETA				
Lumbriculidae	24.0±7.1 (2.2)	349.5 (62.8)	100.0	11.4
Naididae	22.5±17.7 (2.1)	42.3 (7.6)	100.0	7.6

Table F.164. Seasonal (spring) feeding habits of IO+ largescale sucker (n=l) in the Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
EPHEMEROPTERA				
Baetidae	15.0 (0.9)	3.6 (0.9)	100.0	5.1
COLEOPTERA				
Elmidae larvae	267.0 (15.6)	63.6 (16.7)	100.0	6.6
HYDRACARINA	21.0 (1.2)	0.1 (0.03)	100.0	5.1
DIPTERA				
Chironomidae larvae	497.0 (29.0)	33.9 (8.9)	100.0	6.9
Chironomidae pupae	144.0 (8.4)	5.3 (1.4)	100.0	5.5
Tipulidae	39.0 (2.3)	7.6 (2.0)	100.0	5.2
Ceratopogonidae	2.0 (0.1)	0.1 (0.03)	100.0	5.0
Psychodidae	9.0 (0.5)	7.6 (2.0)	100.0	5.1
Nematocera	6.0 (0.4)	0.8 (0.2)	100.0	5.0
COPEPODA				
Cyclopoida	2.0 (0.1)	0.1 (0.03)	100.0	5.0
CLADOCERA				
Chydoridae	475.0 (27.7)	10.9 (2.9)	100.0	6.5
AMPHIPODA				
Talitridae	14.0 (0.8)	9.9 (2.6)	100.0	5.2
OSTRACODA	5.0 (0.3)	0.1 (0.03)	100.0	5.0
GASTROPODA				
Planorbidae	4.0 (0.2)	1.8 (0.5)	100.0	5.0
Lymnaeidae	11.0 (0.6)	26.8 (7.0)	100.0	5.4
OLIGOCHAETA				
Lumbriculidae	1.0 (0.1)	0.1 (0.03)	100.0	5.0
Naididae	122.0 (7.1)	165.9 (43.5)	100.0	7.5
TERRESTRIAL INSECTS				
Formicidae	82.0 (4.8)	43.1 (11.3)	100.0	5.8

Table F.165. Seasonal (summer) feeding habits of 5+ largescale sucker (n=l) in the Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
DIPTERA				
Chironomidae larvae	3.0 (100.0)	0.1 (100.0)	100.0	100.0

Table F.166. Seasonal (summer) feeding habits of 6+ largescale sucker (n=2) in the Pend **Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	4.5±6.4 (0.7)	6.2 (3.8)	50.0	6.1
EPHEMEROPTERA				
Baetidae	7.5±10.6 (1.1)	3.2 (2.0)	50.0	5.9
HYDRACARINA	9.0±12.7 (1.3)	2.6 (1.6)	50.0	5.9
DIPTERA				
Chironomidae larvae	145.5±178.9 (21.6)	61.0 (38.1)	100.0	17.7
Chironomidae pupae	1.5±2.1 (0.2)	0.05 (0.03)	50.0	5.6
Ceratopogonidae	16.0±12.7 (2.4)	0.1 (0.06)	100.0	11.4
CLADOCERA				
Daphnidae	224.0±316.8 (33.2)	5.6 (3.5)	50.0	9.6
Chydoridae	128.5±181.7 (19.1)	4.2 (2.6)	50.0	8.0
OSTRACODA	12.0±17.0 (1.8)	1.7 (1.1)	50.0	5.9
GASTROPODA				
Planorbidae	3.0±4.2 (0.4)	1.6 (1.0)	50.0	5.7
OLIGOCHAETA				
Lumbriculidae	0.5±0.7 (0.07)	0.6 (0.4)	50.0	5.6
BIVALVIA				
Sphaeriidae	122.0±172.5 (18.1)	73.4 (45.8)	50.0	12.6

Table F.167. Seasonal (summer) feeding habits of 7+ largescale sucker (n=7) Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	37.0±61.4 (2.5)	0.7 (0.4)	57.1	5.5
Leptoceridae	1.0±2.6 (0.07)	0.6 (0.3)	14.3	1.4
ODONATA				
Coenagriidae	5.9±11.1 (0.4)	37.0 (18.4)	28.6	4.4
COLEOPTERA				
Elmidae larvae	17.0±45.0 (1.2)	18.6 (9.2)	14.3	2.3
HYDRACARINA	134.7±214.7 (9.1)	6.4 (3.2)	71.4	7.7
DIPTERA				
Chironomidae larvae	334.1±611.6 (22.6)	17.8 (8.8)	100.0	12.1
Chironomidae pupae	8.1±14.8 (0.6)	1.6 (0.8)	42.9	4.1
Tipulidae	0.3±0.8 (0.02)	0.05 (0.02)	14.3	1.3
Ceratopogonidae larvae	53.3±51.6 (3.6)	5.6 (2.8)	85.7	8.5
Ceratopogonidae pupae	1.1±2.6 (0.08)	0.05 (0.02)	28.6	2.6
COPEPODA				
Cyclopoida	0.9±2.3 (0.06)	0.05 (0.02)	14.3	1.3
Calanoida				
CLADOCERA				
Daphnidae	22.3±40.5 (1.5)	1.6 (0.8)	28.6	2.8
Chydoridae	108.3±182.3 (7.3)	8.6 (4.3)	85.7	9.0
AMPHIPODA				
Talitridae	22.6±39.5 (1.5)	25.6 (12.7)	71.4	7.9
OSTRACODA	682.9±875.0 (46.1)	24.8 (12.3)	57.1	10.6
GASTROPODA				
Planorbidae	0.9±1.9 (0.06)	0.1 (0.05)	28.6	2.6
Lymnaeidae	0.3±0.8 (0.02)	0.05 (0.02)	14.3	1.3
NEMATODA	42.4±105.8 (2.8)	46.9 (23.3)	42.9	6.4
TERRESTRIAL INSECTS	1 .1±2.6 (0.08)	5.1 (2.5)	28.6	2.9
BIVALVIA				
Sphaeriidae	5.7±12.6 (0.4)	0.3 (0.2)	57.1	5.3

Table F.168. Seasonal (summer) feeding habits of 8+ largescale sucker (n=4) in the Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
ODONATA				
Coenagriidae	0.5±1.0 (0.3)	0.2 (0.1)	25.0	5.6
HYDRACARINA	0.2±0.5 (0.1)	0.05 (0.05)	25.0	5.6
DIPTERA				
Chironomidae larvae	9.0±12.7 (4.8)	3.7 (3.6)	50.0	12.9
AMPHIPODA				
Talitridae	0.8±1.5 (0.4)	0.05 (0.05)	25.0	5.7
GASTROPODA				
Planorbidae	123.0±246.0 (65.1)	75.7 (72.8)	25.0	36.2
Lymnaeidae	19.5±38.3 (10.3)	14.4 (13.8)	50.0	16.5
OLIGOCHAETA				
Lumbriculidae	0.2±0.5 (0.1)	3.6 (3.4)	25.0	6.3
NEMATODA	35.8±71.5 (18.9)	6.4 (6.2)	25.0	11.1

Table F.169. Seasonal (fall) feeding habits of l+ largescale sucker (n=l) in the Pend **Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
DIPTERA				
Chironomidae larvae	5.0±0.0 (9.3)	0.1 (50.0)	100.0	45.5
OSTRACODA	49.0±0.0 (90.7)	0.1 (50.0)	100.0	54.5

Table **F.170.** Seasonal (fall) feeding habits of **4+** **largescale** sucker **(n=1)** in the **Pend Oreille** River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
CLADOCERA				
Chydoridae	7750.0 (100.0)	18.8 (100.0)	100.0	100.0

Table F.171. Seasonal (fall) feeding habits of 5+ largescale sucker (n=l) in the Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
HYDRACARINA	1.0 (3.4)	0.1 (33.3)	100.0	27.3
CLADOCERA				
Chydoridae	2.0 (6.9)	0.1 (33.3)	100.0	28.0
OSTRACODA	26.0 (89.7)	0.1 (33.3)	100.0	44.6

Table F.172. Seasonal (spring) feeding habits of 2+ longnose sucker (n=l) in the Pend Oreille River.

	Number	Wdnht	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	4.0 (0.1)	0.1 (0.1)	100.0	7.7
COLEOPTERA				
Elmidae larvae	91.0 (1.6)	26.7 (21.0)	100.0	9.4
DIPTERA				
Chironomidae larvae	350.0 (6.1)	24.2 (19.0)	100.0	9.6
Chironomidae pupae	18.0 (0.3)	0.5 (0.4)	100.0	7.8
Ceratopogonidae	16.0 (0.3)	0.1 (0.1)	100.0	7.7
CLADOCERA				
Chydoridae	5063 (88.6)	55.4 (43.6)	100.0	17.9
AMPHIPODA				
Talitridae	135.0 (2.4)	11.6 (9.1)	100.0	8.6
OSTRACODA	1.0 (0.02)	0.1 (0.1)	100.0	7.7
GASTROPODA				
Planorbidae	5.0 (0.1)	5.0 (3.9)	100.0	8.0
NEMATODA	34.0 (0.6)	0.1 (0.1)	100.0	7.8
BIVALVIA				
Sphaeriidae	1.0 (0.02)	0.1 (0.1)	100.0	7.7

Table F.173. Seasonal (spring) feeding habits of 4+ longnose sucker (n=l) in the Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Leptoceridae	1.0 (0.2)	0.2 (0.6)	100.0	8.4
HYDRACARINA	3.0 (0.7)	0.2 (0.6)	100.0	8.4
DIPTERA				
Chironomidae larvae	98.0 (22.0)	5.3 (16.5)	100.0	11.5
Chironomidae pupae	1.0 (0.2)	0.6 (1.9)	100.0	8.5
COPEPODA				
Cyclopoida	24.0 (5.4)	0.9 (2.8)	100.0	9.0
CLADOCERA				
Daphnidae	213.0 (47.9)	4.8 (15.0)	100.0	13.6
AMPHIPODA				
Talitridae	12.0 (2.7)	0.1 (0.3)	100.0	8.6
OSTRACODA	55.0 (12.4)	2.1 (6.5)	100.0	9.9
GASTROPODA				
Planorbidae	36.0 (8.1)	14.5 (45.2)	100.0	12.8
OLIGOCHAETA				
Naididae	2.0 (0.5)	3.4 (10.6)	100.0	9.3

Table F.174. Seasonal (spring) feeding habits of 5+ longnose sucker (n=9) in the Pend Orellle River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTFRA				
Hydroptilic lae	11.4±31.1 (1.8)	0.01 (0.03)	33.3	4.8
Leptoceridae	0.1±0.3 (0.02)	0.2 (0.6)	11.1	1.6
DIPTERA				
Chironomidae larvae	273.0±439.8 (41.9)	11.5 (34.8)	66.7	19.6
Chironomidae pupae	22.2±36.2 (3.4)	4.4 (13.4)	66.7	11.4
Ceratopogonidae	41.6±109.7 (6.4)	0.01 (0.03)	66.7	10.0
Simuliidae larvae	7.0±21.0 (1.1)	1.0 (3.1)	11.1	2.1
CLADOCERA				
Daphnidae	3.4±10.3 (0.5)	0.02 (0.1)	11.1	1.6
Chydoridae	220.8±614.1 (33.9)	8.2 (24.7)	44.4	14.1
AMPHIPODA				
Talitridae	23.8±30.7 (3.6)	1.7 (5.1)	55.6	8.8
OSTRACODA	35.1±58.3 (5.4)	0.2 (0.5)	77.8	11.4
GASTROPODA				
Planorbidae	10.4±23.5 (1.6)	3.0 (9.1)	55.6	9.1
BIVALVIA				
Sphaeriidae	2.4±4.5 (0.4)	2.8 (8.5)	33.3	5.6

Table F.175. Seasonal (spring) feeding habits of 6+ longnose sucker (n=2) in the Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN± SD(%)	%	%
TRICHOPTERA				
Hydroptilidae	2.0±0.0 (0.1)	1.3 (0.4)	100.0	11.5
EPHEMEROPTERA				
Baetidae	5.0±7.1 (0.2)	0.1 (0.03)	50.0	5.7
DIPTERA				
Chironomidae larvae	1454±1992.6(66.5)	67.0 (21.9)	100.0	21.6
Chironomidae pupae	11.5±16.3 (0.5)	4.5 (1.5)	50.0	6.0
Ceratopogonidae	16.5±21.9 (0.8)	12.1 (1.5)	100.0	11.7
AMPHIPODA				
Talitridae	10.0±14.1 (0.5)	9.0 (2.9)	50.0	6.1
OSTRACODA	6.0±8.5 (0.3)	1.9 (0.6)	50.0	5.8
OLIGOCHAETA				
Lumbriculidae	1.5±2.1 (0.1)	96.6 (31.6)	50.0	9.3
NEMATODA	660.0±933.4 (30.2)	38.9 (12.7)	50.0	10.6
BIVALVE				
Sphaeriidae	17.5±23.3 (0.8)	2.4 (0.8)	100.0	11.6

Table F.176. Seasonal (summer) feeding habits of l+ longnose sucker (n=l) in the Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
DIPTERA				
Chironomidae larvae	1.0 (2.2)	0.1 (4.6)	100.0	26.7
NEMATODA	44.0 (97.8)	2.1 (95.4)	100.0	73.3

Table F.177. Seasonal (summer) feeding habits of 3+ longnose sucker (n=l) in the Pend Oreille River.

	Number	Weight'	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
HYDRACARINA	4.0 (5.7)	0.1 (9.1)	100.0	19.1
DIPTERA				
Chironomidae larvae	25.0 (35.7)	0.1 (9.1)	100.0	24.1
Ceratopogonidae	40.0 (57.1)	0.8 (72.7)	100.0	38.3
OLIGOCHAETA				
Lumbriculidae	1.0 (1.4)	0.1 (9.1)	100.0	18.4

Table F.178. Seasonal (summer) feeding habits of 4+ longnose sucker (n=3) in the Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	2.3±4.0 (0.4)	0.2 (0.7)	33.3	4.4
HYDRACARINA	286.7±486.2 (44.3)	5.9 (20.0)	66.7	17.1
DIPTERA				
Chironomidae larvae	19.3±19.7 (3.0)	1.2 (4.1)	100.0	14.0
Chironomidae pupae	1.0±1.7 (0.2)	0.1 (0.3)	33.3	4.4
Ceratopogonidae	40.0±49.8 (6.2)	3.6 (12.2)	100.0	15.4
CLADOCERA				
Daphnidae	2.0±3.5 (0.3)	0.1 (0.3)	33.3	4.4
AMPHIPODA				
Talitridae	5.0±4.4 (0.8)	0.8 (2.7)	66.7	9.2
OSTRACODA	172.7±213.9 (26.7)	6.9 (23.4)	66.7	15.2
NEMATODA	117.7±203.8 (18.2)	5.0 (17.0)	33.3	8.9
BIVALVIA				
Sphaeriidae	0.3±0.6 (0.05)	5.7 (19.3)	33.3	6.9

Table F.179. Seasonal (summer) feeding habits of 5+ longnose sucker (n=7) in the Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	0.7±1.5 (0.09)	0.05 (0.03)	28.6	3.5
Leptoceridae	0.1±0.4 (0.02)	1.1 (0.7)	14.3	1.8
EPHEMEROPTERA				
Tricorythidae	1.7±4.5 (0.2)	2.5 (1.6)	14.3	1.9
HYDRACARINA	38.3±47.3 (4.9)	4.8 (3.1)	85.7	11.3
DIPTERA				
Chironomidae larvae	76.0±132.2 (9.8)	26.4 (17.4)	100.0	15.4
Chironomidae pupae	7.3±14.3 (0.9)	3.2 (2.1)	42.9	5.5
Ceratopogonidae	159.7±275.7 (20.5)	21.6 (14.2)	57.1	11.1
COPEPODA				
Cyclopoida	0.6±1.5 (0.07)	0.05 (0.03)	14.3	1.7
CLADOCERA				
Daphnidae	0.3±0.8 (0.04)	0.05 (0.03)	14.3	1.7
Chydoridae	1.1±2.3 (0.2)	0.05 (0.03)	28.6	3.5
AMPHIPODA				
Talitridae	6.4±15.3 (0.8)	4.1 (2.7)	28.6	3.9
OSTRACODA	386.4±549.6 (49.6)	15.6 (10.3)	71.4	15.8
GASTROPODA				
Planorbidae	4.0±6.3 (0.5)	6.5 (4.3)	42.9	5.8
NEMATODA	6.1±11.1 (0.8)	2.0 (1.3)	28.6	3.7
BIVALVIA				
Sphaeriidae	90.7±210.8 (11.6)	64.0 (42.1)	57.1	13.4

Table F.180. Seasonal (fall) feeding habits of O+longnose sucker (n=l) in the Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
OSTRACODA Cyridae	1936 (99.6)	20.8 (99.5)	100.0	74.8
NEMATODA	8.0 (0.4)	0.1 (0.5)	100.0	25.2

Table F.181. Seasonal (fall) feeding habits of 4+ longnose sucker (n=2) in the Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	11.5±16.3 (0.06)	0.1 (0.04)	50.0	3.8
HYDRACARINA	192.0±260.2 (1.0)	4.3 (1.6)	100.0	7.9
DIPTERA				
Chironomidae larvae	839.0±223.4 (4.2)	0.1 (0.04)	100.0	8.0
Chironomidae pupae	20.0±15.6 (0.1)	0.1 (0.04)	100.0	7.7
Tipulidae	0.5±0.7 (0.001)	0.1 (0.04)	50.0	3.8
Ceratopogonidae	69.5±0.7 (0.4)	0.1 (0.04)	100.0	7.7
CLADOCERA				
Daphnidae	12.5±17.7 (0.06)	0.1 (0.04)	50.0	3.8
Chydoridae	753.0±1015.4 (3.8)	17.5 (6.6)	100.0	8.5
AMPHIPODA				
Talitridae	19.5±17.7 (0.1)	19.2 (7.3)	100.0	8.3
Gammaridae				
OSTRACODA	17918±22106 (89.5)	33.4 (12.6)	100.0	15.5
GASTROPODA				
Planorbidae	76.5±98.3 (0.4)	0.1 (0.04)	100.0	7.7
Lymnaeidae	2.5 ±3.5 (0.01)	129.4 (49.0)	50.0	7.6
NEMATODA	21.0±29.7 (0.1)	0.5 (0.2)	50.0	3.9
BIVALVIA				
Sphaeriidae	86.5±122.3 (0.4)	59.1 (22.4)	50.0	5.6

Table F.182. Seasonal (fall) feeding habits of **5+ longnose** sucker (n=4) in the Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
HYDRACARINA	2.8±1.0 (0.05)	0.2 (0.07)	100.0	14.3
DIPTERA				
Chironomidae larvae	2.0±2.3 (0.04)	0.2 (0.05)	50.0	7.2
Chironomidae pupae	0.5±1.0 (0.01)	0.05 (0.02)	25.0	3.6
Ceratopogonidae	0.2±0.5 (0.001)	0.2 (0.09)	25.0	3.6
CLADOCERA				
Chydoridae	4963±5964 (87.2)	231.5 (79.0)	100.0	38.0
AMPHIPODA				
Talitridae	2.0±2.8 (0.04)	0.2 (0.07)	50.0	7.2
OSTRACODA	717.0±1359.1 (12.6)	15.5 (5.3)	50.0	9.7
GASTROPODA				
Planorbidae	7.0±9.4 (0.1)	45.0 (15.4)	50.0	9.4
NEMATODA	0.5±0.6 (0.01)	0.2 (0.05)	50.0	7.2

Table F.183. Seasonal (fall) feeding habits of 6+ longnose sucker (n=2) in the Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
HYDRACARINA	3.5±0.7 (0.05)	0.5 (0.4)	100.0	11.2
DIPTERA				
Chironomidae larvae	2.5±0.7 (0.03)	0.2 (0.2)	100.0	11.1
Chironomidae pupae	1.5±2.1 (0.02)	0.05 (0.04)	50.0	5.6
Ceratopogonidae	0.5±0.7 (0.01)	0.05 (0.04)	50.0	5.6
CLADOCERA				
Chydoridae	62.5±34.6 (0.8)	1.6 (1.3)	100.0	11.3
AMPHIPODA				
Talitridae	88.5±125.5 (1.2)	5.2 (4.3)	50.0	6.2
OSTRACODA	7289.0±10,308 (97.4)	99.1 (82.6)	50.0	25.6
GASTROPODA				
Planorbidae	12.5±16.3 (0.2)	6.4 (5.4)	100.0	11.7
NEMATODA	1.0±1.4 (0.01)	0.05 (0.04)	50.0	5.6
BIVALVIA				
Sphaeriidae	18.5±26.2 (0.2)	6.8 (5.7)	50.0	6.2

Table F.184. Seasonal (spring) feeding habits of 3+ northern squawfish (n=3) in the Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
DIPTERA				
Chironomidae pupae	43.5±37.4 (97.2)	0.8 (11.5)	75.0	56.5
Ceratopogonidae	0.7±1.2 (1.1)	0.03 (0.4)	25.0	8.2
OLIGOCHAETA				
Lumbriculidae	0.8±1.5 (1.7)	5.8 (88.2)	25.0	35.3

Table F.185. Seasonal (spring) feeding habits of 4+ northern squawfish (n=5) in the Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
ODONATA				
Aeshnidae	0.4±0.9 (40.0)	0.1 (4.0)	20.0	22.8
DIPTERA				
Chironomidae pupae	0.2±0.5 (20.0)	0.1 (2.5)	20.0	15.2
GASTROPODA				
Lymnaeidae	0.2±0.5 (20.0)	1.0 (50.3)	20.0	32.2
OLIGOCHAETA				
Naididae	0.2±0.5 (20.0)	0.9 (43.2)	20.0	29.7

Table F.186. Seasonal (summer) feeding habits of 2+ northern squawfish (n=l) in the Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
DIPTERA				
Chironomidae larvae	44.0 (53.0)	3.9 (49.4)	100.0	33.7
Chironomidae pupae	6.0 (7.2)	1.7 (21.5)	100.0	21.4
GASTROPODA				
Planorbidae	1.0 (1.2)	0.1 (1.3)	100.0	17.1
NEMATODA	32.0 (38.6)	2.2 (27.8)	100.0	27.7

Table F.187. Seasonal (summer) feeding habits of 3+ northern squawfish (n=13) in the Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Phryganeidae	0.08±0.3 (0.3)	3.6 (13.6)	7.7	6.0
ODONATA				
Coenagriidae	0.2±0.8 (0.8)	0.4 (1.7)	7.7	2.8
DIPTERA				
Chironomidae larvae	10.7±30.6 (36.9)	9.5 (36.0)	30.8	28.7
Chironomidae pupae	0.08±0.3 (0.3)	0.8 (2.8)	7.7	3.0
Tipulidae	0.8±2.8 (2.7)	1.0 (3.8)	7.7	3.9
Ceratopogonidae	0.2±0.6 (0.5)	0.8 (3.2)	7.7	3.2
OSTRACODA	0.08±0.3 (0.3)	1.3 (4.9)	7.7	3.6
OLIGOCHAETA				
Lumbriculidae	0.08±0.3 (0.3)	2.8 (10.4)	7.7	5.1
NEMATODA	16.6±23.3 (57.5)	3.6 (13.4)	61.5	36.6
TERRESTRIAL INSECTS	0.2±0.4 (0.5)	2.6 (10.0)	15.4	7.2

Table F.188. Seasonal (summer) feeding habits of 4+ northern squawfish (n=4) in the Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
HYDRACARINA	0.2±0.5 (1.9)	0.6 (6.8)	25.0	8.4
DIPTERA				
Ceratopogonidae	0.2±0.5 (1.9)	0.6 (6.2)	25.0	8.3
CLADOCERA				
Chydoridae	1.0±2.0 (7.6)	0.8 (9.6)	25.0	10.5
AMPHIPODA				
Talitridae	1.5±3.0 (11.3)	2.0 (22.0)	25.0	14.6
NEMATODA	10.0±17.4 (75.5)	2.6 (29.4)	75.0	45.0
BIVALVIA				
Sphaeriidae	0.2±0.5 (1.9)	2.3 (26.0)	25.0	13.2

Table F.189. Seasonal (summer) feeding habits of 6+ northern squawfish (n=l) in the Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
OSTEICHTHYES				
Yellow perch	1.0 (33.3)	2363.8 (99.9)	100.0	58.3
NEMATODA	2.0 (66.7)	0.9 (0.04)	100.0	41.7

Table F.190. Seasonal (summer) feeding habits of 9+ northern squawfish (n=l) in the Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
OSTEICHTHYES	1.0 (12.5)	905.4 (99.9)	100.0	53.1
NEMATODA	7.0 (87.5)	1.0 (0.1)	100.0	46.9

Table F.191. Seasonal (fall) feeding habits of 3+ norhtern squawfish (n=2) in the Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TERRESTRIAL INSECTS	49.5±70.0 (100.0)	2.5 (100.0)	100.0	100.0

Table F.192. Seasonal (fall) feeding habits of 4+ northern squawfish (n=6) in the Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Brachycentridae	1.2±2.9 (2.2)	0.5 (0.9)	16.7	3.3
HYDRACARINA	0.3±0.8 (0.6)	0.6 (1.1)	16.7	3.1
DIPTERA				
Chironomidae larvae	1.5±3.2 (2.8)	0.4 (0.6)	33.3	6.1
Chironomidae pupae	17.5±26.0 (32.2)	1.0 (1.8)	66.7	16.8
CLADOCERA				
Daphnidae	2.0±4.9 (3.7)	0.03 (0.06)	16.7	3.4
Chydoridae	0.3±0.5 (0.6)	0.2 (0.3)	33.3	5.7
AMPHIPODA				
Talitridae	10.3±15.7 (19.0)	1.8 (3.2)	50.0	12.1
GASTROPODA				
Planorbidae	0.2±0.4 (0.3)	0.1 (0.2)	16.7	2.9
Lymnaeidae	5.7±10.3 (10.4)	51.2 (90.8)	50.0	25.3
NEMATODA	9.3±10.0 (17.2)	0.2 (0.4)	83.3	16.9
TERRESTRIAL INSECTS	4.8±11.8 (8.9)	0.4 (0.6)	16.7	4.4

Table F.193. Seasonal (fall) feeding habits of 5+ northern squawfish (n=2) in the Pend Oreille River.

	Number MEAN ± SD(%)	Weight MEAN (%)	Occurrence %	IRI %
DIPTERA				
Chironomidae larvae	0.5±0.7 (7.1)	0.4 (5.9)	50.0	18.0
GASTROPODA				
Lymnaeidae	1.0±1.4 (14.3)	1.9 (22.4)	50.0	24.8
TERRESTRIAL INSECTS	5.5±7.8 (78.6)	6.1 (71.8)	50.0	57.2

Table F.194. Seasonal (spring) feeding habits of 3+ peamouth (n=3) in the Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
COLEOPTERA				
Elmidae adult	637.0±555.9 (98.4)	132.2 (40.5)	66.7	47.0
GASTROPODA				
Planorbidae	2.3±4.0 (0.4)	8.1 (2.5)	33.3	8.3
Lymnaeidae	0.3±0.6 (0.05)	0.05 (0.02)	33.3	7.6
OLIGOCHAETA				
Lumbriculidae	9.3±8.1 (1.44)	88.3 (27.0)	66.7	21.8
NEMATODA	0.3±0.6 (0.05)	0.4 (0.1)	33.3	7.6
TERRESTRIAL INSECTS	0.7±1.2 (0.1)	0.05 (0.02)	33.3	7.6

Table F.195. Seasonal (spring) feeding habits of 4+ peamouth (n=2) in the Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
COLEOPTERA				
Elmidae larvae	0.5±0.7 (1.8)	0.05 (4.8)	50.0	21.7
DIPTERA				
Chironomidae pupae	26.5±37.5 (96.4)	1.9 (1.0)	50.0	56.6
NEMATODA	0.5±0.7 (1.8)	0.05 (4.8)	50.0	21.7

Table F.196. Seasonal (summer) feeding habits of I+ peamouth (n=I) in the Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
CLADOCERA				
Chydoridae	1483.0 (100.0)	2.2 (100.0)	100.0	100.0

Table F.197. Seasonal (summer) feeding habits of 3+ peamouth (n=3) in the Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
DIPTERA				
Chironomidae larvae	1.0±1.0 (1.0)	0.1 (0.01)	66.7	12.0
AMPHIPODA				
Talitridae	0.3±0.6 (0.3)	0.1 (0.01)	33.3	5.9
GASTROPODA				
Planorbidae	25.7±23.2 (24.6)	125.9 (8.3)	66.7	17.6
Lymnaeidae	34.7±41.7 (33.2)	172.3 (11.4)	66.7	19.6
NEMATODA	0.7±1.2 (0.6)	2.7 (0.2)	33.3	6.0
BIVALVIA				
Sphaeriidae	42.0±65.0 (40.3)	1210.8 (80.1)	100.0	38.9

Table F.198. Seasonal (summer) feeding habits of 4+ peamouth (n=l) in the Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
DIPTERA				
Chironomidae larvae	1.0±0.0 (3.1)	0.1 (0.06)	100.0	14.7
Ceratopogonidae	1.0±0.0 (3.1)	0.1 (0.06)	100.0	14.7
GASTROPODA				
Planorbidae	26.0±0.0 (81.3)	156.7 (99.8)	100.0	40.2
NEMATODA	3.0±0.0 (9.4)	0.1 (0.06)	100.0	15.6
TERRESTRIAL INSECTS	1.0±0.0 (3.1)	0.1 (0.06)	100.0	14.7

Table F.199. Seasonal (summer) feeding habits of 5+ peamouth (n=l) in the Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
DIPTERA				
Ceratopogonidae	1.0 (8.3)	0.8 (80.0)	100.0	37.7
OSTRACODA	6.0 (50.0)	0.1 (10.0)	100.0	32.0
NEMATODA	5.0 (41.7)	0.1 (10.0)	100.0	30.3

Table F.200. Seasonal (fall) feeding habits of 6+ peamouth (n=l) in the Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
AMPHIPODA				
Talitridae	1 .0 (100.0)	0.3 (100.0)	100.0	100.0

Table F.201. Seasonal (spring) feeding habits of brown bullhead (n=5) in the Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
EPHEMEROPTERA				
Baetidae	0.2±0.5 (0.5)	0.02 (0.6)	20.0	4.8
DIPTERA				
Chironomidae larvae	25.2±39.3 (60.3)	1.4 (39.9)	80.0	40.9
COPEPODA				
Cyclopoid	14.8±33.1 (35.4)	0.2 (5.8)	20.0	13.9
CLADOCERA				
Daphnidae	0.2±0.5 (0.5)	0.1 (4.1)	20.0	5.6
OSTRACODA	0.2±0.5 (0.5)	0.2 (6.9)	20.0	6.2
GASTROPODA				
Planorbidae	0.6±1.3 (1.4)	0.4 (12.1)	20.0	7.6
Lymnaeidae	0.2±0.5 (0.5)	0.7 (19.7)	20.0	9.1
OLIGOCHAETA				
Lumbriculidae	0.2±0.5 (0.5)	0.3 (8.1)	20.0	6.5
BIVALVIA				
Sphaeriidae	0.2±0.5 (0.5)	0.1 (2.9)	20.0	5.3

Table F.202. Seasonal (summer) feeding habits of brown bullhead (n=9) in the Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	0.1±0.3 (0.3)	0.3 (1.1)	11.1	2.2
Leptoceridae	0.2±0.4 (0.7)	2.7 (9.9)	22.2	5.8
ODONATA				
Coenagriidae	3.6±10.3 (10.6)	12.6 (46.7)	22.2	14.1
DIPTERA				
Chironomidae larvae	8.4±13.8 (25.2)	2.4 (8.8)	66.7	17.8
Chironomidae pupae	0.1±0.3 (0.3)	0.03 (0.1)	11.1	2.0
Ceratopogonidae	5.7±14.8 (16.9)	1.2 (4.5)	33.3	9.7
Simuliidae pupae	0.1±0.3 (0.3)	0.2 (0.7)	11.1	2.1
CLADOCERA				
Daphnidae	0.3±1.0 (1.0)	0.03 (0.1)	11.1	2.2
Chydoridae	0.1±0.3 (0.3)	0.5 (1.7)	11.1	2.3
AMPHIPODA				
Talitridae	2.3±4.8 (7.0)	0.1 (0.2)	33.3	7.2
OSTRACODA	0.4±1.0 (1.3)	0.03 (0.1)	22.2	4.2
GASTROPODA				
Planorbidae	2.9±6.5 (8.6)	0.03 (0.1)	44.4	9.4
Lymnaeidae	0.4±1.3 (1.3)	0.03 (0.1)	11.1	2.2
OLIGOCHAETA				
Lumbriculidae	7.4±22.3 (22.3)	3.0 (11.1)	11.1	7.8
BIVALVIA				
Sphaeriidae	1.2±1.6 (3.[illegible])	3.9 (14.5)	44.4	11.0

Table F.203. Seasonal (fall) feeding habits of brown bullhead (n=IO) in the Pend Oreille River.

	Number	Weight	Occurrence	IRI
	MEAN ± SD(%)	MEAN (%)	%	%
TRICHOPTERA				
Hydroptilidae	0.4±1.3 (0.1)	0.05 (0.02)	10.0	1.3
EPHEMEROPTERA				
Baetidae	2.0±4.7 (0.6)	1.6 (0.6)	30.0	4.0
COLEOPTERA				
Elmidae larvae	0.1±0.3 (0.03)	0.05 (0.02)	10.0	1.3
HYDRACARINA	0.9±2.2 (0.3)	0.02 (0.08)	20.0	2.6
DIPTERA				
Chironomidae larvae	13.9±13.7 (4.2)	5.0 (2.1)	90.0	12.3
Chironomidae pupae	0.3±1.0 (0.09)	0.05 (0.02)	10.0	1.3
Ceratopogonidae	0.5±1.1 (0.2)	0.1 (0.04)	20.0	2.6
COPEPODA				
Cyclopoida	1.1±2.8 (0.3)	1.2 (0.5)	20.0	2.7
CLADOCERA				
Daphnidae	190.4±600.7 (57.5)	31.5 (13.0)	40.0	14.2
Chydoridae	87.9±254.3 (26.5)	16.8 (6.9)	50.0	10.7
AMPHIPODA				
Talitridae	2.2±4.2 (0.7)	0.8 (0.4)	40.0	5.3
OSTRACODA	3.2±4.9 (1.0)	0.2 (0.08)	50.0	6.5
GASTROPODA				
Planorbidae	12.5±14.6 (3.8)	48.2 (19.9)	100.0	15.8
Lymnaeidae	0.9±2.2 (0.3)	6.0 (2.5)	20.0	2.9
Physidae	1.4±4.1 (0.4)	8.4 (3.4)	20.0	3.0
NEMATODA	0.6±1.9 (0.2)	0.05 (0.02)	10.0	1.3
BIVALVIA				
Sphaeriidae	13.0±30.0 (3.9)	122.0 (50.4)	40.0	12.1

APPENDIX G

MONTHLY ANGLER PRESSURE ESTIMATES
AND ANGLER USE PATTERNS OF THE
PEND OREILLE RIVER

Table G.I. Creel census angler counts and catch per unit effort (CPUE) for the Pend Oreille River (January-December, 1989). Based on complete and incomplete trip data.

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Deb.	TOTAL
Number of Boat Anglers Interviewed	0	0	3	1	15	11	7	4	5	1	2	0	49
Number of Shore Anglers interviewed	0	0	7	30	2	9	18	16	11	5	2	0	100
Number of Anglers Interviewed	0	0	10	31	17	20	25	20	16	6	4	0	149
Hours fished (boat)	0	0	0	10	56	56	8.0	6.6	16	1.2	5	0	158.8
Hours fished (shore)	0	0	3.3	29	3	6	11.8	9.7	5.7	4.2	2	0	74.7
Total hours fished	0	0	3.3	39.0	59.0	62.0	19.8	16.3	21.7	5.4	7.0	0	233.5
Number of fish caugh by boat anglers	0	0	0	80	323	405	10	10	44	0	0	0	872
Number of fish caugh by shore anglers	0	0	1	55	28	127	122	80	76	22	2	0	513
Number of fish caugh	0	0	1	125	351	532	132	90	120	22	2	0	1385
Number of fish kept by boat anglers	0	0	0	5	0	0	10	3	7	0	0	0	25
Number of fish kept by shore anglers	0	0	0	1	0	1	3	1	42	22	0	0	70
Number of fish kept	0	0	0	6	0	1	13	4	49	22	0	0	95

Table G.1. (cont.)

Boat angler CPUE (kept and released fish /hour)	0	0	0	7.0	5.8	7.3	1.1	1.5	2.7	0	0	0	5.49
Shore angler CPUE (kept and released fish/hour)	0	0	0.3	1.9	9.3	19.6	10.8	8.2	13.4	5.3	0	0	6.84
CPUE(kept and released fish/hour)	0	0	0.3	8.9	5.9	8.5	6.7	5.5	4.1	4.1	0	0	5.89
Boat angler CPUE (kept fish/hour)	0	0	0	0.5	0	0	1.1	0.4	0.4	0	0	0	0.16
Shore angler CPUE (kept fish/hour)	0	0	0	0.03	0	0.2	0.3	0.1	7.4	5.3	0	0	0.94
CPUE(kept fish/hour)	0	0	0	0.53	0	0.01	0.7	0.2	2.2	4.1	0	0	0.41
Average trip length (based on completed trip data)	-	-		1.26	4.1	4.0	1.7	1.1	3.1		-	-	3.01

Table G.2. Angler preference for locations on the Pend Oreille River based on pressure counts taken during creel census survey (January-December, 1989).

Location	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
SHORE ANGLERS	N = 2	None	N = 15	N = 45	N = 6	N = 7	N = 20	N = 24	N = 4	N = 5	N = 2	None
1A Albeni Falls Dam			73.3	37.8	66.7	14.3	10.0		25.0			
1B Pioneer Park	100.0		13.3	2.2								
1C Indian Island				26.7	33.3		20.0	4.2		20.0		
1D Davis Estates			13.3	20.0			10.0	8.3	25.0			
2A Usk				2.2		14.3		20.8	50.0	60.0	50.0	
2B Cusick				6.7		14.3						
2C Cee Cee Ah						28.6						
2D Riverbend Park						28.6	20.0	12.5			50.0	
3A Panhandler Park				2.2			25.0	50.0				
3B Le Clerc Creek				2.2			5.0	4.2				
3C Lost Creek							10.0			20.0		
3D Tiger												
3E Box Canyon Dam												
BOAT ANGLERS	N = 2	None	N = 3	N = 30	N = 36	N = 26	N = 14	N = 17	N = 16	N = 11	N = 2	None
1A Albeni Falls Dam					2.6		7.1	5.9				
1B Pioneer Park	100.0		100.0	13.3	7.9		7.1	5.9		9.1		
1C Indian Island				16.7	7.9	7.7	7.1			9.1		
1D Davis Estates				10.0	44.7	11.5						
2A Usk					5.3	7.7						
2B Cusick				20.0	10.5	30.8		5.9				
2C Cee Cee Ah				36.7	13.1	38.5				9.1		
2D Riverbend Park					2.6		14.3	17.6	31.2	9.1	50.0	
3A Panhandler Park					5.3	3.8	35.7	52.9	56.2	36.4	50.0	
3B Le Clerc Creek				3.3			28.6	11.8	6.2	9.1		
3C Lost Creek										18.2		
3D Tiger												
3E Box Canyon Dam									6.2			